

Alchemical Treatise of Artephius
by Michel-Eugene Chevreul
Home
Alchemical Treatise of Artephius

Michel-Eugene Chevreul (1786-1889)

of
ALCHEMICAL TREATISE OF ARTEPHIUS

entitled:
CLAVIS MAJORIS SAPI ENTIAE (1)

FIRST ARTICLE.
M CHEVREUL 1867 – 1868
Journal of Scientists

§ I.

From the reproduction of the same treatise under the name:
Sapientissimi Arabam philosophi Alphonsi, regis Castellœ, and liber philosophiae occultioris
(prœcipae metallorum) profundissimus, etc. (2)

French translation of the treatise of Artephius, given in several manuscripts like the work of
Grosparmy, Norman alchemist.

§ II and § III.

Notes relating to manuscripts by Grosparmy, Valois and Vicot, and their authors.

§ I.

Many serious men find wasted the time given to the study of books of antiquity, and especially
of the Middle Ages, written under the influence of the so-called occult sciences, and therefore
the works which are the result of them have, in their opinion, no utility ; but this conclusion
cannot be founded, if it is true that any esteem is accorded to the history of the human mind;
because we must never ignore that the exposition of the errors, aberrations, even absurdities,
to which man has let himself go, is an essential part of this history, and the writer who passes it
over in silence, an unfaithful narrator of reality, would be, with his readers, the partial reporter
of a cause which, presented incompletely,

When we consider the human mind as it really is, sometimes it reaches an unexpected height,
but most often it walks in the rut, and for a long time we have seen it, and even still we see it,
ignoring its weakness, believing that it is rising and that a vast horizon is uncovered before its
eyes, when in reality, duped by the imagination and under the spell of a deceptive mirage, it
has neglected the method: doubtless it is not the mother of great discoveries. , but it alone can
give to the authors of these discoveries the certainty of having found the truth, a certainty

which, preventing them from taking the shadow for the body, the appearance for the real, also preserves them from errors which they may have committed, by not having recourse to a criterion suitable for giving them the conviction, this fruit so sweet to the conscience,

It is from this point of view that it is important to study the past in relation to the mode in which the human mind has proceeded to know the truth, and, in this respect, nothing has struck me more vividly in recent times than a writing entitled the key to the greatest wisdom, attributed to an Arab alchemist named Artephius, who is made to live in the twelfth century, because he quotes Avicenna who lived from 980 to 1036, and that in turn, it is quoted by Roger Bacon, whose life passed from 1214 to 1292. This writing recommends itself to a mind curious about the past by the degree of generalities that it understands and the small number of alleged principles to which it reduces the creation of matter, the distinction of its properties, the regeneration of minerals, plants and animals, and above all again the astral influences and their transmutation.

If the treatises of Geber and a writing of Avicenna on minerals present a certain number of exact facts, from the spring of chemistry and geology, I agree that the key to the greatest wisdom of Artephius contains hardly anything but errors. But the whole of the views which are exposed there, erroneous as they are, the intimacy of their connection, the vast horizon which they embrace, make that by summarizing them one summarizes the knowledge of the Middle Ages, constituting the fundamental part of the so-called occult sciences. Indeed, Artephius speaks of the creation of matter, of four kinds of nature, of transmutation, of the generation of metals, and of minerals, which he distinguishes from these; from that of living bodies, plants and animals. Finally, by acknowledging the strongest influence of the great world, Heaven, on the lower world, Earth, or, in other words, the influence of the stars on the things and living beings of our globe, he shows with much more clearness the idea that was formerly formed of the kind of this influence, than we find it exhibited elsewhere. Finally, in speaking of the relations of the stars with terrestrial beings, he extends his views so far as to define the state of the healthy man and the state of the sick man.

Undoubtedly transmutation, this goal of alchemy, and the astral influences, of which he speaks, borrowed from judicial astrology, these fruits of the A priori method, are errors, and the critical examination that one makes of them does not increase the number of truths; but the review of these opinions reported with all their relief and so different from the opinions expressed in accordance with the experimental a posteriori method, is not sterile for philosophy; it is useful to know these errors, which, as long as they lasted, brought such great obstacles to the progress of true ideas, and this examination, by showing the mind of man more accessible to error than disposed to seek the truth himself, leads the philosopher to find the most suitable aspect under which he must present to him the true ideas which he wants him to accept; moreover, a thorough examination of these errors explains, in many cases, the difficulty one encounters in convincing such a man of the world, whose intelligence has been cultivated, of truths to the admission of which, without his knowledge, a certain disposition of mind puts an obstacle, as well as errors which he has received previously, errors which,

Artephius enjoyed a high reputation among alchemists. Three treatises bear his name:

1st treaty . — Artephii antiquissimi philosophi de arte occulta, atque lapide hilosophorum liber secretus.

It was printed with a translation in 1612 , the privilege said for the first time.

L. du Fresnoy wrongly indicated 1609; obviously this is an error, and he said, moreover, that this treatise is printed in volume IV of the Chemical Theater, while it is the second treatise, *clavis majoris sapientia*.

It is one of the three treatises on natural philosophy not yet printed, etc.

This collection, published by P. Arnauld, Sieur de la Chevalerie, Poitevin, was reprinted in 1659 and in 1682.

The treatise of Artephius is translated into French in the library of the chemical philosophers of Salmon.

2nd milking . — Artefii clavis maioris sapientiae.

Lenglet du Fresnoy speaks of a translation of this treatise without date or place of printing.

3rd treaty . — Artefii de vita proroganda.

There are two printed translations of the first treatise: the *liber secretus*. .; the oldest, three times reproduced by printing in the three editions of the collection of Arnauld, Sieur de la Chevalerie, and the second also reproduced three times in the three editions of the library of the chemical philosophers of Salmon . How is it that only one printed translation of the second treatise, *Artefii demis majoris sapientiae*, has been reported? mentioned by Lenglet du Fresnoy, and so rare besides that I could not see a single copy of it, despite all the research to which I devoted myself? The reason seems to me to be that the first purely practical treatise must have been researched by operative alchemists, while the second, exclusively theoretical, was only researched by speculative alchemists much less numerous and much less eager than the first; however, one would be mistaken to believe that the key to the greatest wisdom has been disregarded. Two facts do not allow me to doubt the reputation it had with a certain number of people convinced of the reality of alchemy.

The first fact concerns the belief in which it was held, until recently, that Alfonso X, king of Castile and Leon, the prince who commissioned the Jews of Toledo to write the astronomical tables to which the recognition of scholars gave the qualification of Alphonsines, had composed a treatise on alchemy. But this opinion is unfounded; for the writing attributed to Alfonso X is nothing other than the book of *Artefii clavis majoris sapientiee*, as I recently recognised. The second fact is the existence of manuscript French translations which I possess, among which there is one which is given as the original work of a sieur de Grosparmy.

The importance of these two facts is not without interest in the eyes of the highest critic, whether one wants to write a detailed and thorough history of the alchemical writings, or

whether one wants, without going into details, to get an exact idea of what these writings were in reality: a way of seeing that the examination of the two reported facts to which I am about to deliver will make evident.

I st done. — The key to wisdom attributed to Alfonso X.

This work is unquestionably by Artephius: it suffices, to acquire certainty, to read the treatise which bears the name of the Arab alchemist in the IV volume of the *Theatrum chemicum*, p. 198; and, in volume V, p. 766, the treatise attributed to Alfonso X. I say attributed, because, if one had read the preface (*proaemium*) of the book *sapientissimi Arabum philosophi Alphonsi*, etc., the error I point out would never have been committed.

Indeed, the text says “that he ordered (King Alfonso) that the a book which is called the key of wisdom be translated from the Arabic language “into his own Castilian language by his squire. m Indisputable proof that the original had indeed been composed in Arabic (3).

How was I led to recognize the identity of the treatises attributed, one to Artephius, the other to Alfonso X? In a very natural way. The fifth and last article on the General Natural History of the Organic Kingdoms of Isidore Geoffroy Saint-Hilaire(4) was intended to combat the opinion according to which the author of this work claimed that the alchemists considered minerals as living beings. After having shown the contradiction in this manner with the ideas generally professed by the most renowned alchemists, ideas which, for a long time, I had co-ordinated into a very precise summary of what may be called the alchemical theory , I added new quotations conforming to my way of seeing things and quite contrary to those I was fighting; among these quotations is (5) the final summary of the treatise attributed to Alfonso; it had remained so well in my memory that, when I examined the writings of Artéphijs for my History of chemical knowledge, the identity of the two treatises was demonstrated to me, and later, § 3, I will have the opportunity to give a new proof of the error of Isidore Geoffroy Saint-Hilaire.

2nd fact.—Three French translations of the Key to Wisdom. I have three manuscript French translations of the treatise *Artefii clavis majoris sapientiae*, which it would be, in all respects, difficult to attribute to the same author; I will therefore distinguish them by the letters A, B and C, in order to prevent any confusion.

Translation a.

This bound quarto manuscript, in perfect handwriting, includes, in sixty pages, the translation of the treatise printed in the IV th volume of the *Theatrum chemicum*, p. 198, and in the first volume of Manget's chemical library (p. 503). It is titled: the major Key of wisdom and science of the secrets of nature of Artephius (sic). Like the text, it is divided into three chapters, but the manuscript also includes sixty-two pages under the title, followed by the practice of the above theory written by the same author.

This practical part is not found after the two aforementioned Latin texts; but we find it in translations B and C.

B and C translations.

For about twenty years, I have owned five large bound folio volumes, each composed of alchemical manuscripts on very varied subjects, and in very different writings. One of the volumes, which has no less than 1183 pages, contains two translations

B and C of The Key of the Greatest Wisdom.

B translation.

It begins on page 1133 of the volume. It consists, like translation A, of two parts:

The first part is titled:

The major key of Artephius (sic), his theory. It includes ten pages.

The second part, comprising eight pages, is entitled: 2 part or pratiq. of Artephius.

These two parts recall well the text of the two parts of translation A; they therefore obviously correspond to the same original; however the second part of translation B presents some difference. Be that as it may, I will point out that the second part of the translation of A and that of the translation of B, which are given as practical treatises, have nothing in common with the practical treatise of Artephius which I mentioned previously, under the title of the first treatise . *Artephii antiquissimi philosophi de arte occulta, atque lapide philosophorum liber secretus*.

C translation.

Translation C, which is in the same volume as Translation 5, is titled (p. 139):

Major key to sapience and science of the secrets of nature, where it is amply treated of the qualities of metals and their transmutation. By Nicolas de Grosparmy to his friend Nicolas de Valois.

If the title of a book has been misleading relative to the name of the author it bears, it is undoubtedly the title that I have just reproduced; for, if the first part of the work, the theory, does not offer the textual translation from the Latin of *Artefii clavis majoris sapientiae*, it faithfully retraces its ideas. It is the same for the second part, the practice, relative to the second part of the two French translations A and B. If we do not read the name of Artéphius in the ; translation C presented as an original work by Grosparmy, a note from the copyist of the Vallois manuscript, inserted at the end of the treatise, and before the treatise given under the name of Grosparmy, leaves no doubt as to the conformity of the ideas supposedly expounded by Grosparmy with those of Artephius and their source (page 137), for the copyist wrote the name of the Arab alchemist.

This key to sapience, given as the work of Grosparmy, is not, without doubt, the textual reproduction of the French translation B beginning on page 1133 of the same volume, but it includes, in reality, all the main ideas expounded under the name of Artephius, in accordance with the preceding note.

This note therefore precedes the work attributed to Grosparmy, sieur de Fiers, and the copy of a manuscript by Grosparmy, seigneur et baron de Fiers, which I will designate later, manuscript A, containing four treatises designated by the numbers 1, 2, 3 and 4. .

§II.

After having explained what I intended to say about the bibliographical part of the treatise *Artefii clavis majoris sapientiae*, I will take advantage of a few pages which remain for me to fill, without exceeding the length of the articles of this journal, to give some details on de Grosparmy and two alchemists whom history associates with him under the names of Vallois and Vicot or Videcoq, the first two gentlemen, the other priest, and all the three Normans, the story adds. I take these details from the manuscripts in my library, which are four in number, and of which I have already had occasion to speak in this journal, as not having been printed (*Journal des Savants*, 1861, p. 768, 759, 760.): I will designate them by the letters ABC D.

Manuscript a.

It is part of the folio volume of which I bet previously in connection with the handwritten French translations B and C you treatis dela Clef de la plus sage d'Artéphius.

It starts on page 2 3 and ends with page 507.

He understands:

1° The five books of Nicolas Valois , companion of Lord Grosparmy , from page 23 to page 137 inclusive.

2° Major key of sapience and science of the secrets of nature .

Where it is amply treated of the Qualities of metals and their transmutation, by Nicolas de Grosparmy, to his friend Nicolas de Vallois ; from page 139 to page 182 inclusive. It is the treatise of Artephius of which I spoke above under the designation of translation B.

3° The manuscript: de Grosparmy, Sieur de Flers , begins with page 187 and ends with page 254 inclusive.

4° The three books of Pierre Vicot Priest, servant of Grosparmy, count of Flers and of Nicolas de Vallois, gentleman, companion of Grosparmy .

They start on page 257 and end on page 507 inclusive

“These three philosophers, says the text, of the same union, friendship, fidelity and concord, made the sacred magisterium and their books for their “successors, in order to leave to posterity full light of this “science which is more clearly taught there than anywhere else in “the other books. »

The key to the secret of Prostrate servant's secrets of philosophy.

Manuscript B, in-4° bound.

He understands:

1° The key to the secret of secrets, by Nicolas de Valois, companion of M. de Grosparmy.

The treatise of, Valois, of this manuscript B, is an extract from the same treatise of manuscript A, but often with the order of the clauses reversed, and where there are expressions of modern French replacing old expressions, for example, fourneau instead of fournel.

2° The major key to sapience and science of the secrets of nature where it is simply treated of the qualities of metals and their transmutation, by Nicolas de Grosparmy and his friend Nicolas de Valois. (There is no doubt that this is a fault of the copyist, for in the manuscript A. there is instead of and.) his friend Nicolas de Valois

This treatise probably reproduces the treatise of the Key to Wisdom from manuscript A, but the author of manuscript B recognizes first that the original work is that of Artephius (Folio 175) , that Grosparmy has abridged it and clarified it especially in the second part concerning the practice, a practice which is not found in the Latin texts of Artephius in the Theatrum chemicum and the Library of Manget.

Manuscript B does not contain the treaty of Vicot, but it has the merit of giving information on the manuscripts of the Comte de Fiers, which I have not seen elsewhere, I will come back to this at the end of this article, § III.

Manuscript C, bearing the superscription ex libris Clavier.

It consists of three bound volumes, two of which contain the Treaty of Vicot and the third the Treaty of Valois and the Treaty of Grosparmy.

Treaty of Vicot. The first volume bears the title:

The key to the secret of the secrets of philosophy or first, book by Pierre Vicot,
Or the priest servant,
Servant of Nicolas de Grosparmy, count of Fiers and of Noël (sic), Le Vallois, gentleman
companion of Grosparmy.

The second book is in the first volume.

The second volume bears this title:

Book III , by the same author.

Secret compendium or final memorial in the form of a recapitulation of my previous books.

If Vicot's treatise, from manuscript C; is not always the exact copy of manuscript A, it is incontestably a reproduction, except that it was thought necessary to soften certain passages, according to various considerations, and, in this respect, I prefer the manuscript to this manuscript, .

The third volume of manuscript C includes, as I said:

1^o The key to the secret The secrets of Nicolas Valois, companion of Grosparmy.

It reproduces Nicolas Valois' treatise from manuscript B, but a few incidental pages have been omitted.

2^o First work or treatise of Nicolas de Grosparmy, of Normandy.

Book I. — Abstract of theory.

Second part, practice.

This treatise by Grosparmy reproduces the treatise of manuscript A except for the last two chapters of the second part: practice.

The manuscript; C does not reproduce the French translation of the plus key. great wisdom of Artephius.

The three volumes of manuscript C have been bound with white sheets interspersed: in the two volumes of Vicot, remarks, reflections, indications of alchemical experiments were written after the manuscript, among which is the indication of an observation made in March 1829, on an experiment; it is perhaps useful to recall that Clavier died in 1817: this observation therefore does not concern him.

Manuscript D, Segurier.

The general title is:

Here are the books of three adepts who made the philosopher's stone at Rouen.

They understand:

1^o Book I

Black.

On the work, of the philosopher's stone, by Nicolas Valois, companion of Grosparmy, and of the master Pierre Vicot; their servant and companion.

Dedicated to his son.

This manuscript is not the textual reproduction of manuscript A, but it includes most of it with some less ancient expressions. It ends with the same piece of verse as manuscripts A and B beginning :

“ If you want to know the way, ”

2^o Book VI e (6). — Practice of mineral work, by Nicolas de Grosparmy.

To his friend Nicolas de Valois.

This treaty is the practical part which succeeds the major key of sapience of Artephius, in the manuscripts A and B. This treaty was published under the name of Grosparmy.

After come:

The practice of vegetable work.

The practice of animal work.

As for the treatise of manuscript A indicated under n° 3 ; it is missing from the Segurier manuscript.

3° The three books of master Pierre Vicot priest, servant of Grosparmy, count of Flers, and of Nicolas de Vallois, gentleman, companion of Grosparmy, indicated under this title in manuscript A, are also indicated in manuscript D.

The key to some philosophical secret which is the first book of Mr. Pierre Vicot (sic) priest, servant of Nicolas de Vallois, gentleman, companion of Grosparmy, who are three of the same union, friendship, fidelity and concord, made the stone of the philosophers and their books for their successors.

This manuscript hardly reproduces more than the first seventeen pages of manuscript A by Vicot, which comprises two hundred and forty-seven.

§ III.

Is it not natural to wonder, when one knows the large number of manuscripts bearing the names of the three followers of Normandy, why they have not; not been printed, and how, in most of the books relating to alchemy, these names have been omitted, I say in the majority, because I hardly know that Dr. Hoefer who spoke of them (7) ? Isn't the cause of this that speculation there dominates too much over practice, and that their followers agree to justify the obscurity of their writings, at the same time as they refer the reader to a certain number of alchemical writings,

I am extracting the information I promised on; the persons of the three Norman alchemists, first of their writings and then of remarks touching the manuscripts of the Comte de Flers, which are inserted in the manuscript B, in 4° (folio 204. page 87).

“There were three who owned the work, M. de Grosparmy, tri-grandfather of the Comte de Flers, Nicolas de Valois, his friend, and Pierre “ Vitcoq or Vicot, his chaplain. »

Manuscript by Grosparmy.

Manuscript A, No. 3, is unquestionably by M. de Grosparmy; the copyist of manuscript B says that the author intended it for the public.

Manuscript .A, nº 3 (8), bears, in the title, a warning as follows:

Grosparmy , Lord of Flers.

“There follows the copy of a manuscript made by Monsieur de Grosparmy “ (sic), sieur and baron de Fiers, and having acquired the said barony and had the castle of the said place built.

“Which manuscript contains theory and practice, and says as much as all the other books; nevertheless that it is well covered, all the work “is contained there; being of course: what can be done by means of the other books cited in the present tense.

"In the name of the great god Trin, one who created all things from nothing, who lives and reigns without beginning and without end...

"To all true disciples of natural philosophy

“Hi and love,

CHAPTER 1 _

Knowing all that I Nicolas Grosparmy, a native of the country of Normandy by the will of God, going through the world from region to region, from the age of twelve until the age of twenty-eight: seeking and desiring to know the art of alchemy which is the most subtle, part of natural philosophy which treats and teaches of the very perfect transmutation of metals and precious stones; and like any diseased body can be brought back and reduced to health. During the said time, I inquired as one of the metals can be transmuted into the species of the other and in doing so I suffered many pains and expenses, insults and reproaches; and abandoned the communication of the world and most of those who called themselves my best friends, for what they had disdained me, me being in need, by wanting to turn me away from the inquisition of the said art, for what it seemed to them that I occupied myself there, and that I did not stop at my other business, and to have this thing arrive, at which, and been with. many a companion seeking the said art as I believed to find by means of them; and to have friendship and entry with them, have made myself their servant, and have supported most of the trouble of their works, and have seen and studied many books in which science is contained in "two ways, one false and the other true..." many a companion seeking the said art as I believed to find by means of them ;and to have friendship and entry with them, have made myself their servant, and have supported most of the trouble of their works, and have seen and studied many books in which science is contained in "two ways, one false and the other true..." many a companion seeking the said art as I believed to find by means of them ; and to have friendship and entry with them, have made myself their servant, and have supported most of the trouble of their works, and have seen and studied many books in which science is contained in "two ways, one false and the other true..."

De Grosparmy says that he finished his writing on December 29, 1549 (9).

If one has read and remembers the writings in which Count Bernard le Trévisan and Denis Zachaire (10) speak of the sorrows and disappointments of all kinds that they experienced long before reaching the goal of their desires, one will see the analogy of their writings with the much shorter account that Grosparmy gives of his travels and his alchemical studies.

"Nicolas de Grosparmy (says the author of the remarks of manuscript B), made the household of the counts of Flers, in lower Normandy very illustrious and very rich, and the original of all his writings is in the hands of the count "de Flers, which he holds so dear and with reason that! hide them from himself."

From Valois.

De Valois, like Grosparmy, recounts his sorrows and his disappointments, and how, with his companions, after having renounced all commerce with the alchemists, they collected themselves in solitude, meditating while reading good books, like those of Arnaud, of Raymond Lully: "But one of us, so inclined to sophisticated individuals, to see "every day new things which dazzled his eyes, did not want to leave them. However, I was 45 years old when this happened in the year 1520 (he was therefore born in 1475), and, after 20 months, we saw this great King seated on his Royal throne, first projecting on white, then on red. (p. 31.)....

"Counting the time that I was on the way that I left in writing until the completion of the work, it only took 18 months, at which time the said work was accomplished, although it had been missed once. (P.32)

I pass to the quotations from the manuscript in-4, B.

"M. de Valois (says the author of the remarks), who was from the house of Ecoüilles, is the father of the little knight (11), composed five books bound in the same volume, where there is at the beginning a large illuminated round figure and two admirable furnaces of M. de Grosparmy, by means of the registers of which one can hatch eggs and melt gold, which he made in the form of a will to his grandson, the knight...."

"Nicolas de Valois, second friend, companion of science and possession of the elixir, built a very splendid house in Caen, which you saw, and left four noble estates to his successors, the eldest of whom bore the name of Sr d'Ecoüille Valois, great lord in Normandy "near the city of Caen... "

"The four plots that M. de Valois had acquired he built them magnificently, each building would not be made for fifty thousand crowns: in one there is a chapel where the hieroglyphs of the work are. He had first married a Lady Hennequin, who, "by her marriage contract, was only to earn a dower of fifteen hundred pounds; but the dower of the second wife was more than "twenty thousand pounds." Ecoüille, Fontaine, Fiers, and the house in Caen.

"He has, moreover, composed a very excellent and very rare book dealing with "Hermetic philosophy, full of hieroglyphic figures," which is entitled: Hebdomas hebdomadam

cabalistarum magorum bracmanorum antiquorum que omnium philosophorum impterioe continens. ...

The author of the remarks adds: "Monsieur de Valois unfortunately died of suffocation from an oyster which he had swallowed whole. »

In the interest of truth I will add that the folio volume which I have designated manuscript A contains a writing in alphabetical order, entitled:

Collection by extract of some philosophers followers, in alphabetical order, where are reported some years of their passages, with some features of the history of their lives, by Sir Jean Vauquelin, dear. sgnr. and Patron of Yveteaux. 1700.

This writing begins on page 659 and ends on page 1060.

It is interesting for the subject that I treat, because the date of 1700 testifies that the author was born in the seventeenth century, and that. as a Norman, gentleman and alchemist, he had had all the facility possible to collect exact facts relative to de Grosparmy, de Valois, and Vicot, who lived in the sixteenth century. I have no doubt, according to the following note in the volume, "this book was given to me by Mons. des Yveteaux, in 1714 that Sir Jean Vauquelin was the author of the collection of numerous writings composing this volume. Well, Messire Jean Vauquelin, in the article Valois (p. 1038), says that Valois completed the great work in the city of Caen, where (eshieroglyphs of the house that he had built there, and that one still sees there in the place Saint-Pierre vis-à-vis the large church of that name, are proof of his science.

If the author of the remarks of manuscript B is right, when he speaks of a chapel built in one of the estates of M. de Valois, where the hieroglyphs of the work are, the gentleman alchemist would have decorated two of his buildings with them.
Vicot.

Manuscript A n° 4 gives some details on Vicot and on Nicolas de Valois, which I will reproduce, because they are not lacking in interest from the point of view of the history of alchemy.

When Nicolas de Valois died, his son, the little knight, was still going to school and studying philosophy. His father bequeathed his hermetic books to him, and recommended to the priest Vicot, his servant, his collaborator and his friend, to initiate his son in alchemical science. It was to fulfill the intentions of a dying father that Vicot addressed his treatise, consisting of three books, to the little knight.

The very concise first book is an exposition of the spirit of alchemy; there is the passage against doctors who prescribe dead gold or silver to their patients, instead of gold or silver made alive by the art of alchemy,

The second book is divided into theory and practice:

The theory consists of 18 chapters and a recap;

The practice is divided into three parts;

First part, practical and material instruments;

Second part, philosophical practice;

Third part, practice of the book.

It is said, in the title of this book, "that it was gilded and written in parchment" and letters of gold and bound at the four corners with four large gold nails, and in it is declared what the masters had hidden a little of which the present is a copy of the original. So this should be kept silent and shown to no one, except he be a perfect philosopher and a "good man, and in pain of incurring eternal pains by the wrath of God.

" WHO FRAUDEM QUAERIT AND HABET COR IMPURUM, HAS RECEDAT ME."

The third book, "where everything is and is declared more clearly than in the others, and is in the form of a recapitulation above all his other books" because of the love he (Vicot) has for this noble and little knight (the son of Nicolas de Valois.?

These details; are in conformity with those which we find in the remarks of the manuscript in-4° B.

M. Vicot, chaplain to M. de Grosparmy and his former domestic servant, because of the extreme love he had for his late master Nicolas de Vallois, composed a large volume which he called the golden binding, half of which was in gold letters and had four large gold nails on the cover, and is similar in size to that of Ni-y colas de Valois; he commands with these words: qui fraudm quaœrit et habet cor imparum (it must be added) a me recedat (p. 297 of manuscript A). And this is the second book, because his first is a small book called The Key to the Secrets of Philosophy , and his third is called Secret, Compendium or Final Memorial.in the form of a recapitulation, but his fourth is the Fables of the great Olympus in verse, with their explanation.

»

Finally, I cannot end this article without fulfilling the promise I made, to give new proof of the error committed by Isidore Geoffroy Saint-Hilaire, when he advanced that the alchemists considered minerals as living beings, contrary to the opinion according to which I had summarized their theory by saying that they considered the gold and silver of nature, such as they are in the earth, as matters deprived of life, and that their art consisted in give it to a small quantity of gold or silver, so that, this bat reached, the philosopher's stone was made ; for it sufficed to put it in contact with base metals for these to change into silver or gold, according to whether one or the other of these metals had been animated, and this conversion was compared to leave which changes;the flour paste into its own substance.

I reproduce textually paragraph 16 of chapter II of the IIIth book of Vicot (manuscript n° 4, page 427). :

“16. Know therefore that each thing begets its like, for “the seed of gold makes gold, and the seed of silver makes silver. But “the vulgar gold, silver and quicksilver are dead, and ours are quick. that is to say, they operate as a living thing, therefore it is not the vulgar who are ours, but the living are nevertheless descended from the dead, for our gold, our silver and our quicksilver are taken from the vulgar gold, silver and quicksilver, which are seen every day. » The living gold of the philosopher's stone had not only the property of transmuting base metals into gold, but the property of maintaining the health of man's body and combating its diseases. From then on the alchemist had a deep contempt for the doctor who prescribed preparations of ordinary gold, to the exclusion of alchemical gold. The following passage from the first book of Vicot (manuscript A n 0 3, paragraph 148, page 295) is proof of this.

“(148). Moreover, these doctors 'donkeys put fragments of gold and pearls in restaurants and confectioneries, not judging that in such a state that man takes gold he returns it to the same state, in which these bastards make it clear that they know that in gold there is great virtue, but never will profit anything, as long as it is attached to his body, from which it can never be separated by any other way than by that of our philosophy, and these wicked people, who do not know this admirable science, cast blasphemies against it and resemble the fox (12), who despised the grapes for not being able to reach them .

These new quotations are added to all the proofs that I have given of the accuracy of the summary in precise terms of the claim of the alchemists, a claim which put the power of their science above the power which they recognized in the astral influences, since, if they regarded the latter as capable of bringing the base terrestrial metals to the state of perfect metal, gold or silver, they refused to these two metals taken in the natural state the faculty of effecting transmutation. , because, to operate it, they had to be alive , and they could not receive lifethan alchemical art. The explanation that I have given of alchemy therefore shows perfectly again the extreme difference that they put between the medicinal preparation of ordinary dead gold, and the preparation of this same metal which had received life from the art of alchemy.

E. CHEVREUL.

NOTES.

(1) *Theatrum chemicum*, vol. IV, p. 198. J. Jacobi Mangeti... *bibliotheca chemica et curiosa*, t. I, p. 503. —

(2) *Theatrum chemicum*, vol. V, p. 766.

(3) *inter alia vero quaa piurima, librum etiam istum, qui clavis sapiesti Æ nuncupalur, de lingua arabica perquendam suum scutiferum iniinguam propriam Castellanam videlicet transferri cura vit...*

(4) *Journal des Savants* , year 1864, p. 648.

(5) *Journal of Scientists* , p. 662.

- (6) Because it comes after the Vth book of Valois.
- (7) History of Chemistry, Volume II, page 127. Two manuscripts are cited: one belongs to the Imperial Library, manuscript 1642, Saint-Germain collection, the other to the Arsenal library, 166, in-4.
- (8) It immediately follows n° 2, which is a free translation of the Major Key to Sapience... by Artephius.
- (9) Manuscript A, page 254.
- (10) Journal des Savants, 1851 , page 494 et seq.
- (11) To whom the five books are addressed (manuscript A, no. 1).
- (12) The manuscript bears the following words drawn with an ink whose color is different from that which had been used previously.

FROM THE ALCHEMICAL TREATISE OF ARTEPHIUS

entitled:

CLAVIS MAJORIS SAPIENTI AE SECOND ARTICLE.

1868

Exposition of the Doctrine of Artephius.

I can only congratulate myself on the reception given to the articles published for a long time in this journal on the history of alchemy and chemistry. In agreement with the scholars versed in the science of the East, Etienne Quatremère, Champollion the Younger and Letronne, I fought the opinion according to which alchemy goes back to the highest antiquity, because it would have been practiced, it is said, in the sanctuary of the temples of Egypt of the Pharaohs. I think I agree again with my honorable colleagues, MM. Barthélémy Saint-Hilaire, Littré and Franck, when I link the development of alchemy to the culture of sciences and such diverse doctrines which occupied, for several centuries, the scholars of the school of Alexandria, of Egypt of the Lagides. alchemy, it seems, spread in Greece, especially in Byzantium, then in Arabia. Finally the opinion, recalled in the preceding article, of the object of alchemy, which I defined the claim of to give life to gold and silver, with the intention of multiplying these perfect metals indefinitely at the expense of base metals, is generally adopted today.

The epoch which I assign to the origin of alchemy is in perfect agreement with the distinction which I have established between its speculative part and its experimental part from the fact that the alchemical writings present both abstract views and experiments; but no real relation existing between the first and the second, alchemy cannot be numbered among the experimental sciences, because the idea that this expression awakens in us is an incontestable connection between phenomena brought to light by experience, and the theoretical explanation that we give of the causes which produce them, a connection that we admit as long as well-observed facts do not come to contradict the theory.

The consequence of this denial of a real relationship between the speculative part of alchemy and its experimental part is to absolutely isolate the first from the second in order to study it as a purely gratuitous hypothesis, and thus to appreciate what it really is and what it is related to in the branches of human knowledge.

I say without hesitation, the speculative part of alchemy belongs to the so-called occult sciences: using this expression, in accordance with usage, I cannot protest too much about its inaccuracy in reason. For all true, real science was hidden from us before we knew it, and it still is in the parts that remain for us to know. From which I conclude that a so-called occult science is not a science.

After all, what was alchemy? the claim to satisfy by preparations, in a word, by material means, the most ardent desires of man, those of wealth and health: now these material means were the philosopher's stone and panaceas, cures for all ills . and capable of prolonging life. The alchemists extended their claim, if not all, at least a large number, to the preparation of precious stones. Nothing, in the ideas of the first alchemists, corresponded to something positive capable of satisfying the spirit, because this something would have belonged to the domain of reasoning. It was necessary, in the path on which we were beginning, to look for a common thread? But where to find it, if not in the occult sciences? this is the origin of the speculative part of the alchemical theory, and the reason which made me say that, in order to clearly understand its meaning, it was necessary to seek its elements in the occult sciences, and that therefore it was necessary to summarize the whole of the occult sciences in such a way as to show their intimate connection with the speculative part of alchemy at the same time as the extreme distance which separates this part from the experimental part .This certainly comes from the workshops and laboratories of the chemical arts;otherwise, how, with the intention of profoundly changing matter in its properties, would one have resorted to purely mechanical operations modifying only the form and other physical properties of matter, instead of resorting to those operations where fire, air and water act to reduce it to ashes, colorless glasses and colored glasses, where powdery materials of earthy appearance appear in the state of shiny brittle or ductile metals. It is therefore the study of these phenomena that gave birth to chemistry, and not purely hypothetical ideas drawn from the occult sciences. Chemistry, as I have long said, is therefore the daughter of the chemical arts and not the daughter of alchemy, After my long studies on the history of alchemy. I believe myself familiar enough with this subject to say how slow, uncertain, if not difficult my progress has been, not wanting, on an absolutely finished past, to advance anything that did not have for me some certainty, and how much I found relieve myselfd by reading the treatise Artefii clams majoris sapientieae because it is by studying it in a very particular way in ; at the same time as I was translating it from Latin into French, that the reason for the origin of alchemy appeared to me clearly without uncertainty as I have just exposed it in a few pages.

In fact, the idea he takes, he says, from Plato and Aristotle, of a matter absolutely deprived of properties, but capable of receiving them all from outside, the distinction of four simple natures, dryness, humidity, coldness and heat, which, united in various proportions, constitute each of the four elements, the immense role he makes the principle of similars play, these are

propositions drawn from the sources of the occult sciences, from the writings of Plato and the Neoplatonists, which, once admitted as in principles, make perfectly clear the conception of alchemy .

It was after having re-read Plato's Timaeus and the writings of the Neoplatonists of Alexandria that the day dawned in my mind to perceive the origin of a great number of ideas which antiquity and the Middle Ages professed; emanations from the method a priori the most perfect, they have traveled through centuries, and their influence is not yet worn.

Returning to the past, comparing the number of publications of which the practical treatise of Artephius, *De lapide philosophorum liber secretus*, was the object relative to that of the publications of the treatise of Artephius, *Clavis majoris sapientiae* , entirely theoretical or rather speculative, I have seen how the number of alchemist operators must have exceeded that of alchemists to whom one could apply the epithet of scholars ; however the two facts that I have brought to light, namely:

1° The treatise *Clavis majoris sapientiae*, considered, for more than six centuries, as the work of Alfonso, king of Castile;

2° The same treatise attributed to the adept Grosparmy, a Norman gentleman, indeed in unprinted manuscripts,

Are proof without replica of the value that was attached to the treatise of Artephius, certainly because of the clear way in which he exposed the alchemical doctrine.

The highest questions occupy Artephius; but, in reading his book, one remains convinced that his aim is less to discuss these questions, like the philosophers, than to derive from them reasons in conformity with the way in which he represents transmutation to himself and wishes to explain it to his readers . Also, going back to the creation of matter by God, recognizing that he created it absolutely passive, or simply receptacle (*receptivum*), neither large nor small, neither thick nor subtle, neither mobile nor capable of being at rest, not to be defined by a name, nor assimilated to any thing, Artephius considered it capable of receiving all the imaginable properties of an external cause, and, therefore, he perfectly prepared his readers to admit transmutation. After matter, light was created; and from the two came heat and motion, then came coldness and dryness, and dampness, which he regards as the result of equal parts of heat and coldness.

Before drawing any consequence from these propositions, let us add the distinction by Artephius of four denatured genera:

- I. The single ;
- II. THE SIMPLE OF THE SIMPLE;
- III. THE COMPOUND OF SIMPLE;
- IV. The compound of the compound.

Ist Kind, the simple. It includes two 'natures:
One activates, heat;

The other passive, coldness.
II^e Kind, the simple of the simple.

It includes four types:
That of heat;
That of coldness;
That of humidity;
That of dryness.

III^e Kind, the compound of the simple.
These are four elements:

1° Fire;
2° Air;
3° Water
4° The earth.

IVth Genus, the compound of the compound. These are the bodies beget of the elements, namely;

1. The body of the corporeal soul ;
2° The body of the corporeal spirit;
3° The corporeal body of the body.

Before going further, let us explain the extreme difference of Artephius' idea of matter as he imagines it, created by God without properties, and the way in which we represent it to ourselves a posteriori, that is to say according to the natural facts to the knowledge of which observation and experience lead us.

Artephius supports his opinion of the creation of matter without properties, those of Plato and Aristotle. I admit that by resorting to the Timaeus, I saw nothing that indicated a creation of matter by God, but quite explicitly the arrangement of a matter-chaos in a harmonious whole that Plato compared to an animal, so much intelligence, supreme had happily coordinated the parts of the whole together !

Plato does not say explicitly; God created matter, because it is stated in the following way:
"God, wanting all to be good and nothing to be bad, as much as possible, took the mass of visible things which moved without movement, without form and without rule, and from disorder brought order out of it, thinking that order was much better....

"God, wishing to make the world similar to what is most beautiful and most perfect among intelligible things, made it a visible animal, one, and containing within itself all the other animals, as being of the same nature as itself..."

As for Aristotle, he admitted matter existing from all eternity. Here are his words: 1 "In one sense matter perishes and is born, and in another sense it is neither born nor perishes." What perishes in it is deprivation; but potentially it neither arises nor perishes in itself.

Far from it: there is a need for it to be imperishably uncreated.

..... Because I call matter, this primitive subject which is the support of "everything, and where does the thing that comes out of it come from originally and by accident ... "

Be that as it may, the a posteriori method abstains from betting on the origin of matter; he studies it with its properties and, for a long time, man has been forced to admit that he knows it only by these same properties. To speak therefore of its essence, of its quintessence, with the alchemists, alluding to something other than the properties which we know and those which it is given to us to know, is to abandon the experimental A posteriori method, to throw oneself into a path which has not led to any real goal,

Let us first recall that I have made three groups of properties: physical properties, chemical properties and organoleptic properties, since man only knows properties of matter, and only knows them well after having studied each one separately, I have called these properties and their relations abstractions, and, like each; of them. is a separate part of a whole of a concrete whole, I have called these abstractions facts, because ultimately they are the only things of matter that are accessible to our knowledge.

We; easily sees now that both; first genera of natures distinguished by Artephius, are only abstractions, of; properties isolated from matter by the mind; for evidently the four natures which comprehend the, second. genus, the simple of the simple, .ne; are other than the oven; properties which, long before Artephius, each served as a character for each of the four elements; the heat characterizing the fire, the coldness, the air, the humidity, and finally the dryness of the earth.

But in. seeking how Artephius constituted his third genus, the compounds of the simple, with the four elements, by considering these known, concrete things, like the way in which we today consider chemical species, we soon find the reason for it; in the way in which he had considered chemistry.

Indeed, the four elements each comprised the four natures, of the second kind, the SIMPLE OF the simple; what distinguished them was the difference in the respective proportions, for example:

The fire element was composed of heat and dryness united in equal proportion with heat and moisture which resulted from the union of equal parts of heat and cold.

The Air element was represented by fire plus moisture;

The water element was by the composition of the air, plus coldness and humidity.

The earth element was by the composition of water, plus coldness and dryness .

Artephius admitting the absolute passivity of matter at the moment of its creation, it is easy to conceive how the four elements, however concrete they were according to him, having received the same properties from outside, but each in different proportions, were capable of being transformed into one another by any causes whatsoever, capable of bringing about a change in the respective proportions of. simple natures.

Let us pass to the fourth genus , the compound of the compound , and see how Artephius explains generation. of. their different kinds.

(A) The fire element unites with the air element in equal part, and the result of the union is the body of the corporeal soul.

(B) The water element, uniting with the corporeal soul, produces the body of the corporeal spirit.

(C) The earth element, uniting with the body of the corporeal spirit, produces the corporeal body of the body.

Consequently, while admitting the materiality of the spirit and the soul, Artephius considers them as the finer parts of matter, and, according to him, the firm soul, more fire than the spirit; in this, Artephius agrees with many spiritualists who considered the spirit as an intermediate substance between soul and matter , necessary for their mutual union. .

We see that the first two kinds of Artephius do not include anything concrete, but abstractions realized in entities, causes of phenomena likely to affect our senses, when these abstractions, these entities, coexist in, concrete things , included in. the last two genera : elements and compounds of compounds.

Since matter was created without properties, according to Artephius, but it is capable of receiving all sorts of them from the outside, we can easily imagine the possibility that the stars exert influence on terrestrial bodies.

But on what cause does he cause these influences from heaven on earth to depend? Of the principle of similars , by which a star of a given nature tends, by virtue of this nature, to impress it, to communicate it to a body which is in a favorable position to receive this influence.

The principle of similars explains, according to Artephius, all that the mind conceives to be done by union; so that opposites, like heat and cold , only unite through an intermediary, which is humidity. Now, in this conception, there is a question of principle, since Artephius regards humidity as the result of the union in equal parts of heat and cold .

When we admit the three propositions of Artephius which we summarize as follows:

1. Matter created without properties, but with the aptitude to receive them of all kinds by causes acting from without;

2. The elements formed each of the four simple natures (or four properties), but in various proportions;

3. The Principle of Similars ,

We can clearly conceive the influence of the stars on terrestrial bodies, and the transmutation of base metals into precious metals, gold or silver, is no more than a particular case of a very general fact. Also nothing is simpler than the conception of the influence of the stars of our solar system on the terrestrial inorganic bodies, to which he relates the generation of metals and minerals. After having explained it as he conceives it, I will speak of the generation of plants and animals.

But it is important for me to point out that all the Neoplatonists, Plotinus among others, did not admit the influence of the stars on terrestrial beings, as the Chaldeans had imagined; great supporters of judicial astrology; they admitted a direct and effective action on the part of the stars on man, on his happiness or his misfortune, on his health or his illness, according to the position of the stars in the sky at a moment in his life. Prayers, sacrifices, certain practices, could avert the evils that threatened him.

Plotinus, rejecting this power of the stars, admitted that, as signs, they could make known future events to those who knew how to interpret them, just as, according to him, the flight of birds reveals the future to augurs without these birds having the slightest influence on events (*Enneads of Plotinus.. translation of Bouillett, t.1, p. 169 and 170.*). Plotinus therefore believed in the reality of signatures, in the inductions that one could deduce from certain similarities of celestial bodies with terrestrial bodies, inductions entirely in conformity with the principle of similars.

Plotinus admitted that the universe is one, and that, subject to a single harmony, as are all the parts of an animal, all the parts of the universe were signs : evidently Plotinus thought with Plato that the world is an animal and visible.

Artephius seems to have accepted judicial astrology in all its extent, as we shall see further on, when, in connection with the generation of animals, he gives the means of bringing down the spirit of a star into a terrestrial object by placing astride this object or its image a cross whose point is that of the star itself.

Once the creation of matter is realized, Artephius admits the generation of metals and minerals as well as that of plants and animals, and he extends the astral influences to inorganic bodies, metals, minerals, precious stones, as well as to plants and animals.

§ I.

Generation of metals and minerals.

Artephius conceives the power of a star on a terrestrial mineral substance in a very simple way according to the respective natures of these stars, he says:

Lead comes from :Saturn; its nature is like that of Saturn;
Tin comes from Jupiter; his nature is like that of Jupiter;
Iron comes from Mars; his nature is like that of Mars;
Gold comes from the Sun its nature is like that of the Sun;
Quicksilver comes from Mercury; its nature is like that of Mercury
Money comes from the Moon; its nature is like that of the Moon;
Copper comes from Venus; her nature is like that of Venus.

This is how I translated the Latin of Artephius, *Plumbum enim de parte Saturni, sua natura est ut sua natura*, etc. Perhaps it will be thought that it would have been more correct to translate *de parte Salami*, by the side, instead of comes from. The reason for my preference is found in the prescription of the means, which he gives later in speaking of the generation of animals, of bringing down the spirit of a planet into an earthly object. One must form, prescribes it first, a cross of the matter (corpore) of the planet; then take a censer from the material of the cross(*postea accipimus thuribulum de minera illa de qua fecimus crucem.*) So I think that if it is the spirit of Saturn, the cross like the censer must be made of lead. This is the reason for my translation of *parte Salami*. What else does Artephius say? it is that, if the astral influences were not diverse, all terrestrial mineral bodies would be gold!

Ultimately , the influence of a star on a terrestrial object is determined, in accordance with the principle of similars , by the nature of the star. But we will see that Artephius does not limit this influence to the single metal of the planet, but that he admits there an influence due to its color, to its smell, to its flavor, and still to perfumes, to herbs of the nature of this same planet. Before having studied the work of Artephius, *Clavis majoris sapientiae* , I had not understood the influence of a star on an inanimate terrestrial body to change it into a certain substance, whereas after having seen how he considers the relation of each planet to a metal, and the immense importance which he attaches to the principle of similars, all astral influences seemed to me easily understood from the point of view of alchemy and astrology .

Metals can be changed into minerals, and these into metals, as the elements can be changed into each other, as is easily understood, since they are each formed of the four simple natures. Artephius counts three causes of their specific differences:

1. The diversity of proportion of simple natures;
2. The diversity of energy of each simple nature which can manifest in four degrees;
- 3° The diversity of subtlety or fixity.

If Artephius uses the word generation for metals and minerals, as well as for plants and animals, and if, speaking of a mineral egg, formed of the four elements, he adds that all generation is impossible without conjunction of a male and a female, and that consequently fire

is according to him the male of water , as air is of the earth, it is, in my opinion, very remarkable that he pointed out in the most striking manner the quite extreme difference of this pretended mineral egg with , not only the animal egg , but the vegetable egg or the seed . .

§II.

Of the generation of living beings.

Indeed, is it not remarkable that the philosopher who admits the creation of matter by the word of God, who sees in the spirit and the soul only the most subtle parts of matter, who, after having seemed to assimilate inorganic bodies to plants and animals by speaking of a mineral egg, himself points out the extreme difference of this egg with the vegetable egg and the animal egg, is it not remarkable that at the beginning of such a subject, starting from the rightest observation he enunciated the highest thought ! Is it not of the greatest interest, in the study of human opinions, when Artephius, man a priori, brought back to the, made by the method a posteriori, grateful; the impossibility; to do. a plant with water and earth in it, although it is formed, he thinks, of these elements, is it not, I say, of the highest interest in the study of human opinions, to hear him PROCLAIM the indispensable necessity of an egg for the production of a living being ?? and that, therefore, before going into details, he seems to reject any idea of spontaneous generation by saying: the mineral egg cannot undergo transformation without crushing or dissolution, whereas, the seed containing the plant in potentiality, the trituration destroying the organism destroys the plant.

Let us now say how the first minerals, the first plants and the first animals; were, according to him, engendered , or rather generated.

Matter created without properties received from external causes those which make it sensible to us;

These external causes were the stars for the earth. Each planet, being in a sign of the zodiac in direct communication with the earth, engendered minerals, then it began to move, and this continued. The minerals produced first deteriorated. The stars showed themselves again, and plants were generated from the same minerals. This movement ceased, the plants were altered, the movement returned and the stars determined the generation of the animals; at the expense of plants.

A. — Of the generation of plants.

Plants were therefore begotten from the matter of minerals, and these plants produced seeds which, under the influence of the sun and moist earth, feeding on water and the subtle parts of the earth, developed into stems, leaves, flowers and seeds, and the duration of the species was thus assured.

B. — Of the generation of animals. We have come to the most curious part of Artephius's writing, the third and last chapter, the subject of which is the generation of animals.

1. He first considers reanimating from the point of view of his vegetable food, having regard to the maintenance of his material part and his intellectual part.

2. He then examines the composition of the human body in relation to the state of health and that of disease.

3. Finally he exposes the way to bring down the light, the spirit of a planet in an earthly being.

1. Of the animal from the point of view of its vegetable food.

Artephius starts from the idea that the animal draws its food from the plant; by adding the words immediately and immediately the proposition is true.

According to him, during digestion, the subtle of the plant passes into the animal, is assimilated to it, we would say today, and thus separates from the gross (gross).

The subtlety of the plant is split into two parts:

One formed of coldness and humidity of water, uniting with equal part of heat and humidity, belonging to the animal, produces the matter of its soul called by Artephius nature of equality.

The other part of the plant's subtlety rises to the brain to engender there the nature of its intelligence (*natura ipsius sensus*), composed of three parts of light and one of darkness.

This light, reflected from the part of darkness to the heart, illuminates it: If the animal is of upright stature like man, the intelligence is everywhere distributed, instead of being concentrated and latent in the body. This is the cause why animals do not reason like man.

2. Composition of the human body.

The body of man is composed of a certain mixture of equal natures with unequal natures.

Equality of nature consists of:

1° An occult equality,

It is the nature of the soul.

It results from part cold and humidity with equal parts heat and humidity,

2° An apparent equality of the four humours, namely:

The blood, warm and moist, of the nature of the air;

Bile , hot and dry, of the nature of fire;

Phlegm , cold and moist like water;

The melancholy, cold and dry, of the nature of the earth. The equality of these humors is the cause of the conjunction of the soul with the body.

Everyone knows the intimate link between the idea of harmony in the philosopher's thought and numbers, or rather the relationships they express; None of Plato's readers is unaware of the importance that the Greek philosopher gives them and cannot therefore be surprised at the way in which Artephius envisages the health and illness of man, because it is perfectly in conformity with the composition he attributes to his body.

Perfect health results from the occult equality and the apparent equality of the four humors, because, according to Artephius, the conjunction of the soul with the body is perfect.

If then equality ceases absolutely, the soul becomes free from the body and death takes place.

But, if the equality is disturbed only within certain limits, there is malaise, trouble or disease.

And health returns if the doctor is happy enough to restore equality.

Artephius is unquestionably a deist when he speaks of matter created by God; however, while admitting the existence of the soul and the spirit, he attributes a material nature to them, and, moreover, a Muslim alchemist, he speaks of the devil (Diavolus) and recognizes in him the power to take possession of a human body .

But what kind of influence will the devil exert? Artephius makes it depend simply on the elementary composition which he supposes for it, which is represented by fire and air . If therefore the devil enters the body of a man affected with a bilious disease, the disease is aggravated, because the hot and dry bile of the nature of the air, dominant in the bilious disease, is exalted by the fact of the presence of the devil, composed of fire and air. And the predominance can go until death by breaking the conjunction of the soul with the body.

What remedy does Artephius prescribe to drive the devil out of the body where he is?

It is to bring down the light of a planet into the possessed .

And why?

It is that the devil is invisible, because the fire, more subtle than the air, by penetrating this one, becomes latent.

From then on, the light, being contrary to the occult nature of the devil, fights against his power, and, if it goes so far as to overcome it, the possessed person returns to health.

3. Means prescribed by Artephius to bring down the light, the spirit of a planet, into an earthly being.

Nothing testifies more strongly to the importance that antiquity and the Middle Ages attributed to the principle of similars, than the means prescribed by Artephius to bring down the light, the spirit of a planet on a thing, on an earthly being.

Here it is a question of the mineral nature of the planet, its color, its smell, its perfumes, its flavor, its herbs; and the author shows this whole subject subordinated to the principle of similars. The man who serves as intermediary between the planet and this earthly object on which he calls the light the celestial spirit , prepares for the work by putting himself, as much as

possible, in harmony of resemblance. with the star; he prepares himself with a fortifying diet, he puts on clothes of the color of the planet, and wherever he is when it rises, he must stand, humbly pray to the Creator to fulfill his desire, and once accomplished, he gives him thanks. After making sure that the star does not enter its sign through an opposite planet, let it make a cross of the matter (corpore) of the planet $\dagger$. Its long branch will be hollowed out so that it can be placed astride the earthly object. This object could be an allegorical image about the work. For example, says Artephius, a figure of a lion or a snake, if it is about enemies to be fought and overcome, or a bird., if it is a question of escape from my great peril, or even of apulpit (cathedra) if it is a question of desired honors. Before we move on, why this cross of planet matter? It is, according to Artephius, that any sensitive object having longitude and latitude, two lines which intersect at right angles present an arrangement of parts common to all that we see or touch.

A censer made of the material of the cross, having only a hole in its top, will be charged with the perfumes of the nature of the planet, and the smoke will be directed into the hollow part of the cross.

Finally a clean bed, shiny and uncovered, will be placed in the open air at the place where one operates; and all around we will have spread plants of the nature of the planet, after having taken the precaution of removing any object that we would have judged likely to harm the desired effect.

Artephius goes into details which I do not reproduce, and says that one can imagine the spirit of the planet descending on the terrestrial object by two lighted candles, one of which, having just been extinguished, is placed parallel against the other, and in such a way that the still smoking wick is below the flame. The extinguished candle is then relighted by means of the smoke which catches fire as soon as it touches the flame of the candle which has not ceased to burn.

All these details from the writing of Artephius, which I have not seen elsewhere; will no doubt justify the importance that I attach to his book *Clavis majoris sapientiae*, as long as one tries to understand the thought of those who proposed to bring down the light, the spirit of a planet, into a thing, into an earthly being. The enumeration of material things, such as the mineral part of the planet used to make a cross; and a censer, the plants of the nature of this planet, the organoleptic properties that he recognizes in it such as color, flavor, smell and perfumes, finally the shape of a cross suggested exclusively by the idea of two lines which intersect at right angles, an idea which any object sensitive to sight or touch presents to the slightest reflection, are details which show the generality of the principle of similars, and the importance which was attached to it ,

E. CHEVREUL.

of
ALCHEMICAL TREATISE OF ARTEPHIUS

entitled:
ARTEFII CLAVIS MAJORIS SAPIENTIAE.

1868

THIRD ARTICLE
OPINIONS ON THE MATTER OF PLATO, ARISTOTLE, MEDIEVAL SCIENTISTS AND MODERN
CHEMISTS.

§ I.
Opinions of Plato and Aristotle on the origin of matter.

Artephius, after saying that matter was created by God before anything else, added in accordance with the opinion of Aristotle and Plato, advanced an incorrect proposition.

Plato says: "God, wanting all to be good and nothing to be bad, as much as possible, took the mass of visible things which moved without movement, without form and without rule, and out of disorder brought order out of it, thinking that order was much better....

God, wanting to make the world similar to what is most beautiful and most perfect among intelligible things, made it a visible animal, one and containing in itself all the other animals, as being of the same nature as it..." (Timeus translation of Cousin, volume XII)

What Plato's words express is the order which God brought out of chaos by the fact of the creation of the form in which the universe appears to us, and, under the charm of the admiration caused to him by the spectacle of the order which governs the animal economy, he exclaims: The universe is a single and visible animal!

Aristotle considers matter as uncreated and imperishable; because he says:
In a sense matter perishes and is born; and, in another sense, it neither arises nor perishes.
What perishes in it is deprivation; but potentially it neither arises nor perishes in itself. Far from it, there is a necessity which is imperishable and uncreated.

.. because I call matter this primitive subject which is the support of each thing, and from which comes originally and not by accident the thing which comes out of it. »

These passages borrowed from Plato and Aristotle prove that Artephius was wrong to suggest that the two Greek philosophers explicitly attributed the creation of matter to God; but what must not be lost sight of is the very great influence which both have granted to the form.

§II. Formation of the world according to Plato.

Plato presents, in the *Timaeus*, to his readers the general thoughts to which he relates all the main parts of the universe, whether they are passive things once produced or active causes.

Having everything, he admits that God has presented to thought a model image of the universe, which he will, if not create out of nothing, at least organize by drawing it out of chaos and giving it the form that we see.

The general idea which he attaches to the world is that of the animal: indeed, the constancy with which, for centuries, the specific form of the least of the animals has been perpetuated, in the circumstances in which we live, does it not give to the mind the highest idea of the perfect harmony of all the parts of a whole which nothing else presents in a manner as striking as it is magnificent!

Starting from the principle that no thing produced can be intelligent if it has no soul, Plato puts intelligence in the soul and the soul in the body; and, not wanting the oldest to obey the youngest, the formation of the soul precedes that of the body.

Devoting this article especially to the history of matter, such as antiquity and the Middle Ages have considered it, and such as we have considered it since Lavoisier, I should, if necessary, pass immediately to the exposition of Plato's ideas on the formation of the four elements, but, in the preceding article, I spoke and had to speak of the opinion of Artephius on bodies in general, deprived of life as well as plants bodies and animals, and, therefore, I cannot dispense with to say a few words about the opinions of Plato relative to the nature of the soul and to the formation of bodies as he exposed them in the *Timaeus*.

According to Plato there exists in the soul an indivisible essence and a corporeal divisible essence: moreover, these two essences, being opposites, require, in order to unite, an intermediate essence resulting from the very union of opposites.

Any reflection on my part on the opinion of Plato would be misplaced, especially considering how far the ancient philosophers and modern scholars, who have examined it, are in agreement on the very meaning of his words; however, a remark will not be superfluous, it is the begging of the question relating to the intermediate essence formed of the two extreme essences which it is a question of bringing together; but, if we recall an analogous criticism made in the preceding article (January 1862, p. 52), when Artephius, after having distinguished four simple natures, those of heat, cold, humidity and dryness, apropos the difficulty of the union of opposites, says that, in order to unite heat with coldness, there must be an intermediary formed of equal parts of this same heat and of this same coldness, the begging of the principle becomes evident, and, moreover, as I have remarked, the opinion of Artephius lends itself to a criticism from which the opinion of Plato is sheltered; for, considering the nature of humidity as the result of the union of equal parts of heat and coldness, this nature, having become binary, must cease to count among the simple natures. (Thesis presented to the Academy of Sciences, 2 of April, year 1867.)

Whatever the criticism, it is certainly curious to see what Plato said of the way in which God proceeded to mix the three essences of which the soul is composed. "He blended them all into a single species, forcing violently, despite the difficulty of the blending, the nature of the other to unite with that of the same; and, mingling these two natures with the essence, and of the three things having made one, he again divided this whole into as many parts as it suited, so that each of these parts presented a mixture of the same, the other and the essence. (Timaeus of H. Martin, volume I, page 97.)

Plato says later (p. 113) that God brought about the mixture which forms the soul of the world in a vase. Certainly nothing that can be operated mechanically comes so close to the intimacy of the principles of chemical combination as Plato's idea of an intimate mixture produced by mechanical means!

The soul once formed. God formed within the world of the body and united it harmoniously with the soul, the two centers coinciding: the soul thus spread in space, from the center to the extremities of heaven, envelops it, and, turning on itself, establishes the divine beginning of a perpetual and wise life for all the sequel of time. (Idem, page 99)

This is the soul of the world conceived by Plato.

Let's move on to the formation of the stars.

The Earth, the oldest of the stars born in the sky (Timée by H. Martin, volume I, page 109.), winds around the axis of the world.

Then come the Moon, the Sun, Lucifer (Venus), Mercury, Mars, Jupiter and Saturn. (Idem, volume II, page 64)

Time was born with the sky; the Moon, the Sun and the other five planets are born to fix and maintain the numbers which measure it. (Idem, volume I, page 103.)

Plato describes the stars, including the earth, as animals. There are more, produced by God, they are his children, gods as well as the stars. (Idem. volume I, pages 105 and 109.)

These children of God, gods themselves, are neither immortal nor absolutely indissoluble, and yet Plato assures us that they will never die, nor be dissolved.

Plato counts four species (categories) of animals:

The celestial race of gods that will not die, Are the first;

The other three, mortals, are:

The second, a winged and flying species;

The third, living in the waters;

The fourth, walking on the earth. (Idem, volume I, page 113.)

He adds that the gods received from God, their father, the mission of forming the three mortal species destined to bring heaven to its perfection; and that, to fill it, they received a mixture of substances less perfect than the substances which had entered into the formation of the soul of the world and into the formation of themselves, God thinking, according to Plato, that, if he had formed these three species himself, they would have been equal to the gods , his children . Each star received apart from the mixture specific to the formation of the three mortal species.

Man was formed by the gods from an immortal principle, the seat of intelligence, and invisible, and from the four elements acting at random and without rules, visible and tangible. (6 Idem, pages 115 and 117.)

After having spoken of the formation of the soul, I insisted on the thought expressed by Plato of the importance he attached to the intimacy of the mixture of the three essences which contribute to its formation, a mixture which he operated in a vase, as I said. I then spoke of the formation of the gods whose composite nature is not absolutely immortal or indissoluble, but who must neither die nor dissolve. I now insist on the difference attributed by Plato between the formation of the gods and that of man. The parts which constitute the human body are not united by indissoluble bonds like those which unite the parts of the gods (*), for they are only held together by means of multiplied and imperceptible pegs, absolutely mechanical structure and very different from this intimacy of the mixture of the three essences constituting the soul.

(*) Timaeus of H. Martin, page 117.,..., "they (the gods his children) therefore took the immortal principle of the mortal animal, and, imitating him who had made them themselves, they borrowed from the world parts of fire, earth, water and air, which were to be returned to him one day; they united them together, not by indissoluble bonds like those by which God had joined the parts of their own body, but by multiplied and imperceptible ankles., . .

Certainly, between the expression of indissoluble bonds inherent in the parts of the body of the gods, and the expression of multiplied and imperceptible ankles, which join together the parts of the body of the man until his death, there is, in the thought of Plato, a real difference; because the parts of the body of the gods being indissoluble forever, if he did not have the clear idea that we have today of the intimacy of the union in bodies constituting a chemical combination, nevertheless it must be recognized that in speaking previously of the intimacy of the mixture of the three essences of the soul ,there is here between the united things a union very different, by its extreme intimacy, from the union of the parts of the body of man attributed to slender ankles, and even from the union of the parts of the bodies of the gods resulting from indissoluble bonds whose action, exerted on the outside, is completely mechanical and very different from the intimacy of the mixture of the three essences of the soul .

E. CHEVREUL

of
ALCHEMICAL TREATY OF ARTEPHIUS

entitled
ARTEFII CLAVIS MAJORIS SAPIENTIAE.

1868
CONTINUATION OF THE THIRD ARTICLE.

§ III.
Of the four elements of matter according to Plato.

It has been said and repeated so much that, in Plato, imagination prevails over reason; that his writings take more from the brilliance of the poet than from the severe logic of the philosopher, that in developing all my thought I fear the reproach of having been seduced by the brilliance of the form rather than by the solidity of the content; however, having never concealed a conviction when I deemed it useful, I will continue to examine Plato's opinions on matter and the elements that constitute it.

When we study Plato's thought on matter, after having reflected on the opinions of which it was the object in antiquity and the Middle Ages, taking into account the ideas that we currently have of the various chemical species into which material beings have been reduced, since Lavoisier, the extent of the spirit of the Greek philosopher is really striking: several passages from Timaeus, written from the highest point of view, testify to the awareness he had of the insufficiency of his knowledge to resolve all the questions which his genius foresaw ; and this reserve highlights, in my opinion, the profound correctness of his mind, since he felt what he still lacked to justify forecasts whose scientific value could only be appreciated after Lavoisier.

My interpretation of Plato's thoughts on matter requires me to distinguish above all that the Greek philosopher considered his subject from two points of view:

A. A posteriori, that is to say by observing the phenomena that matter immediately presents; in other words, from the Empirical point of view.

B. A priori, that is to say going beyond observation, by considering it from the metaphysical point of view, in such a way as to show its properties clearly defined and in perfect agreement with the harmony of the world, such as he had conceived it.

FIRST ARTICLE.

(A.) Of the matter considered by Plato from the a posteriori point of view.

Let us begin by pointing out that Plato, in explicitly regarding the four elements of matter as corporeal, because they are visible and tangible, evidently characterized them by the two

properties which modern scholars regard as the essential attributes of matter, namely, limited extension, sensible to sight (and touch), and impenetrability, sensible to touch.

The four elements left alone do not produce anything reasoned, because it belongs only to the soul alone to act as an intelligent cause.

What happens to Plato when he wants to know: the elements such as nature offers them to our study is only an attentive observer of; various phenomena that each element presents to him, his mind convinced of the impossibility of defining this element in a precise manner because of the varied aspects under which he sees them, before this impossibility, he recoils; and, a scrupulous observer, faithful then to pure empiricism, he stops at appearances. I reproduce the passage from Plato to which I refer, as M. Henri Martin translates it - Volume I, p. 133.

“Here is the truth on his account, but it must be explained more clearly: now it is very difficult, above all because of the questions that, for that, one must first ask oneself about fire and about the three other kinds of bodies. For which of them should really bear the name of water, rather than that of fire, and why should any of them bear one of these names rather than all the others or each of them? answering this question in a certain and irrefutable way is very difficult. How shall we proceed, and what plausible solution could we give to this embarrassing doubt? First, what we now call water, we think we see that by condensing it becomes stones and stone and dividing itself from wind and air that the inflamed air becomes fire and that reciprocally the condensed and extinguished fire resumes the form of air; that the air brought together and thickened changes into clouds and mists, which, still more compressed, flow into water, that from the water the earth and the stones are re-formed, and that thus, it seems, these bodies are engendered; each other periodically. So, since we cannot represent each of them as always being the same, dare to firmly maintain that any one of them is that which must bear such-and-such a name to the exclusion of any other, wouldn't that be to ATTRACT LAUGHING ON YOURSELF ? It is impossible and it is much safer to stick to the following idea: when we see something which passes constantly from one state to another; fire for example, we must not say that this is fire, but such an appearance is that of fire nor that this is water, but that such an appearance is that of water. »

This long quotation has contributed to making Plato appear to me in a light in which I had never considered him before, that I cannot help recalling ideas that have been expressed for a long time, so that my readers, having before their eyes the elements of my judgment, can appreciate for themselves whether my admiration for the author of the Timaeus is not based on solid reason, rather than on unreflected feelings inspired by the poetic imagination of the philosopher. I will summarize in the form of three proposals ideas put forward a long time ago and already reproduced in this journal.

Three essential proposals from Mr. Chevreul for understand what he will say next about Plato.

1st proposal .

The four elements of the ancients correspond to the four states of aggregation of the particles or molecules of matter, so that the solid state corresponds to the earth, the liquid state to water, the gaseous state to air, the ethereal or imponderable state to fire.

This proposition explains certain facts of the history of science which, without it, we would not be aware of.

2nd proposal .

Before referring to a cause acting as an attractive force, and the union of homogeneous molecules, simple or complex, in solid or liquid aggregate , and the union of heterogeneous molecules producing a chemical compound, the idea of chemical combination did not exist, and the cause to which these unions were attributed was confused with that of the mechanical phenomena on which the production of a force which acts externally was made to depend. It was therefore from 1717 and 1718 that the combination could really be distinguished from the simple mixture, thanks to Newton and François Étienne Geoffroy.

This distinction belongs above all to Newton, when he related the phenomenon of attraction to a force inherent in matter itself.

How do we conceive of the intimacy of chemical combination in the atomic system where we admit that an atom does not penetrate another atom, that is to say that there is simply juxtaposition as in the mixture? In a very simple way: the properties of a compound, for example sulfuric acid, are neither those of sulfur nor those of oxygen, but the resultant represented by the properties of 3 oxygen atoms and those of 1 sulfur atom; so that, as long as the sulfuric acid is maintained, it is by this resultant that it acts; but, if it decomposes, two different actions are manifested, that of 3 atoms of oxygen and that of 1 atom of sulphur. independent of each other,

3rd proposal .

The distinction of the properties of chemical species into physical properties, chemical properties, organoleptic properties, made in 1824, has been of great use to me; and it is especially in the fifteen years that have just passed that I have been able to appreciate all the importance of it, when I said, if we observe the properties of the first two groups with the organs of our senses, however we are certain that they exist and manifest themselves outside of us and independently of our organs, while the organoleptic properties of the third group are within us . When we say: the orange blossom has a pleasant smell, the sugar a sweet taste , evidently we transport, by a figurative language, effects, sensations of our own organs, interior properties, to the rose blossom, to the orange blossom and to the sugar, which are the causes of these effects, of these sensations; and we are still powerless to perceive any connection of intimacy between the effects and their causes. The colors, smells, flavors are therefore in us and not in the bodies, but the causes of these sensations are in these bodies .

It is the same with our foods and poisons, they awaken, they highlight properties of ourselves.

The organoleptic properties, the physical properties and the chemical properties are therefore very different; for the crystalline form, the transparency, the movements produced by magnetism and electricity, the fall of bodies by virtue of gravity, are evidently independent of us; these properties do exist in foreign bodies to our own person; and the same is true of two bodies producing phenomena by virtue of chemical action, for example, lumps of sugar dissolving in a glass of water.

Consequences of the three propositions.

The great advantage of the distinction of the first two groups of properties is to bring to mind the extreme difference between simple mixture and chemical combination, produced by a force inherent in the molecules, the action of which does not exceed the apparent contact of the bodies which take part in it, so as to form a compound, perfectly homogeneous, whose properties differ more or less from those which the bodies manifest before the combination. Prior to the time of this distinction, chemical phenomena were explained by purely mechanical causes.

Finally, if the distinction of organoleptic properties has not explained in what way the properties which are attached to it are essentially distinguished from physical properties and chemical properties, it has prevented many errors by showing the difference between phenomena absolutely independent of us occurring outside of us with phenomena which occur within us, of properties of which the felt organs are the very seat.

Applications of the three proposals.

As soon as a somewhat attentive observation fell on the external world, one had to distinguish the solid body, the liquid body, the gaseous body and fire. It is therefore not surprising that the ancient philosophers, as well as the scholars of the Middle Ages, who were unaware that the chemical species, if not all, at least the greatest number, can, without alteration, each affect the solid state, the liquid state and the gaseous state, have, like Plato, admitted the three elements representing these three states, and the fourth, fire, representing the ethereal state.

But Plato, in carefully considering these four elements in nature, in accordance with the method a posteriori, ignoring what was not considered general until the end of the eighteenth century, the three states of aggregation, common to the same species of body, was so struck by the manifestation of fire within the air conversion of the elements into each other, and (stinks, without a doubt, this way of seeing the elements contributed not a little to found the alchemical ideas three or four centuries later.

This remark is, in my opinion, fundamental quite, when one seeks in antiquity the source of alchemical ideas.

DIVISION 2.

(B) Elements considered by Plato from the a priori point of view.

All persons familiar with research in the field of the natural sciences must doubtless be struck by the subtlety of Plato's observations, when he spoke of the appearances under which the four

elements appear in nature, and of the conclusions as conforming to philosophy as to the a posteriori method which he drew from them, when it was a question of naming each of them by a scientific expression of a perfectly defined meaning .

I say, without hesitation, that the distinction of the three categories of properties in the study of bodies 1 explains how Plato, confusing these categories into one and ignoring that the same body is capable of affecting the three states, solid, liquid and gaseous, without undergoing any alteration, was unable to define the elements with the precision which today governs the definition of chemical species. In the time of Plato the imperfection of human knowledge was an insurmountable obstacle to the genius of the philosopher animated by the desire to explain the formation of the world; it is indisputable, but, limiting the study that we make of the Timaeus to the preceding quotations, one would have only an imperfect idea of the opinion of Plato on the elements; it is necessary, to complete it, to know how he envisages them no longer a posteriori, but a priori.

"So when God undertook to organize the universe, fire, water, earth and air already showed some traces of their own form, but were nevertheless in the state in which an object of which God is abused must be. Finding them therefore in this natural state, the first thing he did was to distinguish them by forms and numbers.

..But now I must try to show you the arrangement and the formation of each of these species by employing an unusual language.

...."First of all fire, earth , water and air are bodies: it is obvious, I think, for everyone. Everything that has the essence of the body has depth, and everything that has depth is necessarily understood on all sides between planes. Moreover, any base offering a perfectly flat surface is composed of triangles, and all triangles are originally derived from two triangles, each of which has a right angle and the other two acute....

"Thus it is necessary to say which are these four beautiful bodies, dissimilar to each other, and which are those which, by dissolving, can generate each other. Indeed, if we can succeed in this, we shall know the truth concerning the formation of earth and fire, and of the means which form with them a proportion; for then we will agree that there are no more beautiful visible bodies than these, each of which belongs to a separate genus. We must therefore strive to harmoniously constitute these four kinds of bodies excellent in beauty, and to show you that we have sufficiently understood their nature (Timaeus ,) . "

Without fire nothing is visible, and without earth nothing is solid. God, beginning to form the body of the universe, took fire and earth. But two bodies cannot unite without a middle term, and, according to Plato, a single middle giving only a surface without thickness, the body of the universe being solid, two middle terms are necessary: hence, for Plato, the reason for the existence of air and water placed between the extremes , fire and earth .

Certainly it is hardly possible not to see in this reasoning of Plato the justification of what I said of the correspondence of the four elements with the four states of aggregation of the material particles.

Plato goes into great detail to attach each element to a determined regular form; thus the pyramid (the tetrahedron) is the form of fire; the regular octahedron, that of air; the regular icosahedron, that of water; finally the cube, that of the earth.

By assigning a regular form to each of the four elements, Plato tested to the great importance he already attached to the application of geometry to the study of the symmetrical forms which he foresaw should exist in bodies. In addition, these regular solids constituting each element, too small to be visible, were only united in large numbers, a way of seeing which is that of the moderns, whether it is a question of atoms or molecules!

I do not want to exaggerate anything, but, in the distinction of the four elements by geometrical forms qualified today as crystalline, and in the thought that the sample of one of these elements is sensitive to our organs only because it is a set of particles of a regular structure, there is a considerable fact; and should not the historian of science point out that Plato rose to this great idea by the sheer force of his mind, while modern scholars have been led to it successively by crystallography, physics, and chemistry.

The ideas that Plato attaches to the form of the four elements agree perfectly with the correspondence that I have established between these elements and the four states of aggregation of the particles of bodies, as the following passages from the *Timaeus* prove . “By giving this kind of base to the earth (that of the cube), we remain faithful to probability, and, similarly, by attributing to water the most stable of the others, the least stable to fire, and that which holds the medium to air; the smallest body to fire, the largest to water, the medium to air; the sharpest to fire, the second under it related to air, the third to water. Thus, of all these bodies, that which has the least number of bases must necessarily be the most mobile, the sharpest and the sharpest of all, and also the lightest, since it is composed of a least number of the same elements. The one who has the least afterwards holds the second rank in this double respect, and the one who has the most holds the third. Let us therefore say, according to right reason and according to probability, that the species of solid which has the pyramidal form is the element and the germ of fire; that the second whose formation we have described is that of air, and the third that of water. »

This passage shows that Plato, admitting only one group of properties in matter, could explain chemical phenomena only by having recourse to forces acting from without on the molecules of bodies and entering into what are commonly called mechanical forces. We therefore understand that, for him and for all those who did not explicitly admit chemical properties distinct from physical properties, the meaning of the words solution and dissolution differed greatly from that which we attribute to them when we apply these words to the disappearance of a solid in a liquid, caused by the mutual affinity of the two bodies, that is to say by an attractive force residing in the molecules of the two bodies, whereas, for Plato, these words apply to the separation of solid particles or rather of particles in general operated by forces acting outside.

The meaning of these two words is much more precise in modern scientific language. We say that the corpse deteriorates, decomposes, because its matter is transformed into less complex compounds than those which constituted it when life animated it. The meaning of the words solution and dissolution is much more restricted; it is only said of a solid body and, by extension, gaseous and even liquid, which disappears into a liquid, by virtue of an attractive force by which the molecules of the dissolved body and of the solvent are animated.

Without wishing to establish in a precise manner how Plato conceived the intimate structure of the elements, and the transformations of water, air and fire, I limit myself to the remark that he had regard only to physical properties and particularly to form.

Plato therefore admits the transformation of the elements a priori, as well as a posteriori.

I quote the following passage from a note of the IIth volume, page 251 of the translation of MH Martin.

.... "but, once they are accepted (two points), nothing is easier than to explain his whole theory of transformations. Indeed, separate the twenty triangular bases of a regular icosahedron; since $20 = 8 \times 2 + 4$, you have enough to form the bases of two regular octahedra and of a regular pyramid, that is to say that a corpuscle of water can give two corpuscles of air, plus one of fire. Likewise, because $8 = 4 \times 2$, in an octahedron you find the bases of two pyramids, that is to say, a corpuscle of air can give two corpuscles of fire. Conversely, since $4 \times 2 = 8$, two fire corpuscles can unite into an air corpuscle, and since $8 \times 2 + 8/2 = 20$, two and a half air corpuscles divided along their bases can unite into a water corpuscle. »

DIVISION 3.

The organoleptic properties explained by Plato, by means of simply mechanical forces.

We clearly see the impossibility where Plato found himself, knowing only physical properties, to understand all the facts of the spring of the chemical properties, to conceive the combination. Is this impotence not in all its light when he is led to say that an icosahedron of water is reduced, by a mechanical division, into two octahedra, representing two corpuscles of air and a pyramid representing a corpuscle of fire, and that an octahedron of air gives two pyramids or corpuscles of fire which mechanically bring disorder into the living body into which they penetrate.

Why is the fire hot? This is because it is made up of very fine, cutting and sharp parts, which are animated by an extreme speed.

Where does the feeling of cold come from? It is that the thickest parts of the liquids which surround our body, repressing by penetrating there the most delicate interior liquids; but, being unable to move them, they compress the humors of our body and tend to coagulate them. This effect is therefore contrary to that of fire.

Plato further mechanically explains sour, bitter, salty, pungent, and sweet flavors.

It is the same with his explanation of smells; but the considerations he relates to it are singular enough for me to present a summary of them. "There are no determined species (of smells), he says; for all smell is a half-formed thing, and there is no kind of body whose proportions are such that it has any smell whatsoever. The veins which serve us for the sense of smell are too narrow and constricted for the parts of earth and water, and too wide for those of fire and air, so that no one has ever found any odor in these parts; but odors always arise from bodies which become wet, putrefy, melt, or volatilize. Indeed, when water changes into air, or air into water, odors are formed as intermediaries between these two bodies, and all are smoke or vapour; what passes from the state of air to that of water, it is steam; what passes from the state of water to that of air is smoke. Thus odors are all finer than water and grosser than air. Plato concludes that there are only two kinds of smells, agreeable and disagreeable, the species of which have not been named.

Plato says: "that the colors are the fire which, flowing from every body and having particles proportioned to the fire of sight to produce sensation. Here then, on the colors, is what is most likely and what it is now time to explain. Among the particles which, carried away from the others, are going to encounter the visual fire, some are larger than the very parts of this fire, others are smaller, others are equal to them. The latter do not cause sensation, and they are called transparent.....

All the preceding quotations are more than sufficient, I think, to show that organoleptic properties were not distinguished by Plato from physical properties.

A final consideration on the importance of the distinction between physical, chemical and organoleptic properties is the awareness that this distinction gives of the existence of physical properties and chemical properties. In bodies placed outside of us, whereas, if we attribute color, taste, smell, to bodies placed outside of us, we cannot relate to these bodies the very sensation that we receive from them; it is in us, so we cannot attribute it to them, as we attribute to them gravity, electric and magnetic properties, their actions. chemicals. We extend the organoleptic properties to all the analogous actions produced by any bodies whatsoever on living beings.

If one is familiar with the distinction of organoleptic properties from the two other groups of properties, one will conceive Pyrrho's paradox much better than when this distinction is misunderstood. Because, once the consciousness acquired by the experimental way, that the physical properties and the chemical properties exist independently of us, one has the certainty that the reasoning of Pyrrho could only put in doubt the existence of the organoleptic properties. In addition, we can relate many facts that Kant describes as subjective to organoleptic properties, when we distinguish these properties, in a very precise way, physical properties and chemical properties: I recall here the criticism that I made of the expression subjective colors which, used to distinguish the complementary color that any color, from its limits, tends to give birth to in us, what, in opposition to the first, we qualify as objective color. In the language of Kant, this distinction of an objective color and a subjective color is completely opposed to the precise idea that one must have of color vision, because two colors

are in reality organoleptic or, if you will, subjective, and this distinction is in contradiction with one of the most remarkable laws of vision, that of simultaneous contrast as I define it.

§IV.

Reflection on the difference between divine works and human works.

By re-reading the *Timaeus* and what has been written on the model present in the thought of God before the organization of the world, he has seemed that my definition of the fact and the extension it received from my distribution of human knowledge from the spring of natural philosophy, made it possible to expose the thought of Plato and the interpretations of which it was the object with more clarity than had been done before.

Plato says, and it is evident that God had "his eyes fixed on an eternal pattern," when he formed the universe.

Staring eyes are obviously a figurative expression; the eternal model, image of the material universe which was to be produced, could not be material; for supposing it such, it would have been eternal, a proposition absolutely contrary to the opinion of Plato.

I have always thought that the philosophers who spoke of God creating matter, or simply organizing it, as Plato says, admitted if not explicitly, at least implicitly, that his thought embraced all the properties, all the relations, all the harmonies of the beings he was going to create or form, so that all the parts of the created or formed world would present the most beautiful and best-ordered whole in its details that man could imagine. I have never been able to understand the power of God otherwise.

It has been said that the divine thought, before the creation or the formation of the universe, had conceived the properties, the qualities, the attributes, of concrete beings. Obviously, these properties, these qualities, these attributes, had to be part of the model, of this metaphysical or absolutely ideal form of which Plato speaks: admit their existence before the model and you will be led to count two successive acts in the divine thought, one concerning the conception of properties, qualities, attributes, separated, the other, the meeting of these in ideal forms corresponding to the specific forms of the various concrete beings composing the universe.

This opinion of the existence of properties, qualities, attributes, attributed to divine thought before the model of the universe, is contrary to the opinion of Plato, since, according to him, this model is eternal; consequently the divine thought included in this model the properties, the qualities, the attributes which all the concrete beings of the universe would have, formed in its image; and, moreover, does not the contrary opinion lessen divine thought, bringing it closer, up to a certain point, to human intelligence, such as I envisage it?

The time has come to clearly expose the extreme difference which distinguishes the opinion expressed by Plato on matter, in accordance with the a priori method, and the opinion which I profess in accordance with the experimental a posteriori method.

I believe I have done full justice to Plato, by setting out what he said of the elements considered first a posteriori, and then a priori, in their very essence, going back to God. Now this last way of considering them is absolutely opposed to the proposition that, matter being known to us only by its properties, we are absolutely ignorant of its essence; and this proposition, an incontestable expression of experimental science, is the opinion which I profess, and the consequences of which are the definition of the word fact and the distribution of human knowledge within the province of natural philosophy.

Indeed, as soon as the conviction is acquired that the concrete is known to us only by properties, qualities, attributes, which the intelligence separates from it by virtue of its faculty of analysis, and which it studies successively and comparatively in order to seek their mutual relations, I admitted that these properties; these qualities, these attributes, true abstractions of the mind, deserve, in all respects, the qualification of facts, since they are the true elements of the knowledge that we have of concrete beings, when, after having studied these facts separately and comparatively, we restore them by synthesis, a faculty contrary to that of analysis, to each concrete being from which analysis had separated them.

Have I considered the two faculties of human intelligence, analysis and synthesis, to which man owes the character of perfectibility which distinguishes him from animals, as absolutely superior faculties? No doubt not; for if, in the positive study of the external world, the use of the two faculties is not subjected to the experimental a posteriori method prescribing the control with regard to any induction deduced either from analysis or from synthesis, the induction born can be admitted as truth-demonstrated. From this point of view, these two faculties therefore testify to the weakness of human intelligence rather than to its greatness and elevation.

This way of considering human intelligence does not seem to agree with the opinion of existence, in. In the thought of God, properties, qualities, attributes of the concrete prior to the production of the concrete, so that these properties, these faculties, these attributes, before being realized in the concrete universe, would have existed in the state of ideal forms, - clearly represented by the word idea translated, not by the word image, but by the word idea
?experimental, admitting in fact that, knowing the matter only by its attributes, it is to advance that we: ignore. absolutely what has been called its essence; according to this, if Artephius, as I have said, exaggerated the opinion of Plato, when he spoke of the existence of a prime matter, devoid of all property, yet Plato considered chaos-Matter as private, if not absolutely. ; of all, property defined at least showing only some appearances. Between this way of considering the raw material as not having well-defined properties, and the opinion to which the experimental a posteriori method leads me, that our knowledge of matter is limited to that of its properties; without: dispute the difference is obvious.

I have spoken of the (weakness) of the intelligence of man relative to such divine intelligence; than the philosophers who admit a creation or a; organization of a. chaos-matter designed it; therefore it will not be superfluous; to compare to each other.

The divine intelligence is complete and absolutely perfect; almighty, she organized, if not created the world, such as it is with all its harmonies as soon as she wanted it. His science, like his power, is therefore infinite.

The intelligence of man, incomplete; and imperfect, is incapable of creating or organizing anything like divine power.

It is limited to knowing what is, and yet it uses two faculties, analysis and synthesis, the control of which is necessary to give man the consciousness of the truth with regard to concrete beings and rarely yet arrives at the truth without taking error several times for itself!

But is the truth he knows infinite? Does she understand the knowledge of all that exists ..in the universe? Far from it, it is limited; and the mind of man does not even understand how space can be either finite or infinite!

Man is ignorant of the essence of bodies. He only knows them by their attributes, and more than two centuries have passed since then; that Pascal felt his powerlessness to define the word other than by qualities , by attributes, Human science is therefore limited to attributes, both when it comes to the physical world and the world. moral. The concrete noun is therefore known to us only by adjectives!

Arrived at this point that the elements of all that we know are. attributes , separate abstractions . From an all-concrete, the real relations between the principal branches of a knowledge and of the genius of man, the sciences, letters and the fine arts, become comprehensible, and, if we want to reconsider the opinion of those who have supposed that God, before the creation of the universe or of concrete beings, had present to thought the properties, qualities, attributes and their mutual relations, independently of the thought of beings. concrete elements which were to be provided with these properties, of these qualities, of these attributes, we will have an exact idea, in my opinion, of what man has to devote himself to an original and intellectual work, falling within the fields of science, letters and fine arts. But these elements, implemented by the genius of man, are not created by him: the first fruits of an analysis directed by simple observation, by thoughtful observation, and again by the insight and the highest reason of which man is capable, scientific synthesis coordinates them into laws of nature, or the genius of mechanics, by combining the solid, the liquid and the gas, makes a machine whose economy recalls that of the animal .Finally, drawing from the same source, the literary genius composes with them fantastic forms, no doubt, but which, by addressing the intelligence alone, strike it like the bodies that make us sensitive and the relief and the color, or move it deeply by the most sympathetic expression of the noblest feelings as well as the highest of moral nature!

There is therefore this enormous difference between the divine work and the human work, that man, having neither created nor organized anything, is reduced to knowing, by science, what has been created or organized by God, and that the facts or the truths that he has observed are, ultimately, the elements available to the scholar and the artist for their respective works .

conclusion.

If man does not create anything, and if, after having studied, without any other interest than the truth, he acquires the certainty of this impotence, is he not led to admit the existence of a superior being, endowed with the creative power?

Do you reject this conclusion?

Tell us then according to what facts you conceive that forces devoid of all intelligence, such as you consider those which govern brute matter, would have formed this universe, man included; and how you conceive that, superior by reason to all that exists, this man would be incapable of doing anything comparable to the least of living beings, produced according to you by brute matter, governed by blind forces; obviously man would then be an effect without a cause.

If you qualify my conclusion as mystical, in my turn am I not entitled to tax your opinion with being contradictory to any somewhat rigorous logic?

E. CHEVREUL.

of the TREATY ALCHEMICAL D'ARTEFLUS

entitled:

ARTEFII CLAVIS MAJORIS SAPIENTIAE .

SECOND SUITE

OF THE THIRD ARTICLE.

1868

Of some opinions of antiquity and of the opinion of the alchemists on the matter. — On the application of the principle of similars in the physico-chemical sciences and in aesthetics.

Undoubtedly the doctrine of the four elements admitted by Plato and most of the scholars of antiquity, of the Middle Ages and of modern times up to three quarters of the 18th century, testifies to its importance; if the alchemists admired it, they had the merit of distinguishing better than had been done before them, under the name of mixture, the compound of the mixture, and, moreover, of recognizing different orders of mixtures. But, before presenting a summary of their doctrine on matter, let us say a few words about the philosophers who admired only one element, and about those who reduced the elements to four properties, each of which characterized them respectively, according to them.

§ V.

Matter reduced to a single element.

I must recall that before Plato there were in Greece (from 640 to 500 before the Christian era) philosophers who admitted only one element. Indeed, Thales (—640) considered water as the universal principle, while for Anaximenes (—557) it was air, and for Heraclitus (—500) fire.

I do not know if it is the remoteness from the absolute, which I have always known myself, and the extreme need to account for myself as satisfactorily as possible of the phenomena in the midst of which our life passes, which gave me the profound disgust I feel for these idle speculations, as old as the world, which have never occupied anything but pure imagination or a light knowledge more inclined to the charms of speculation than to researches excited by the hope of changing doubt into certainty. The truth is that I have never explained to myself the penchant that a somewhat elevated intelligence could have for the opinion of the unity of matter, when, seeking the cause of the greatness of the benefits rendered to the present society by science, it would not find it in the severity of the method according to which no proposition is admitted as truth without having previously undergone the most severe examination; because from then on it would be flagrantly inconsistency on his part to refuse to admit, with Lavoisier, not in an absolute way, but conditional to the state of current knowledge, among simple bodies, those of which, up to now, experience has been powerless to separate several kinds of matter from them.

Without claiming to make the partisans of unity accept my opinion in any way whatsoever, I will never tire of repeating that the progress of science requires on their part the obligation to demonstrate the accuracy of what they call great thought, great synthesis, and that one of the means of achieving this consists in explaining the causes of the differences, which are precisely the reasons why their adversaries do not think like them.

§ VI.

Elements considered as having only one property .

If Plato explicitly considered the four elements as absolutely material beings by considering them a posteriori, and if he defined them each a priori by a geometric form, while attaching great importance to the molecular state according to which they are solid, liquid, gaseous and ethereal, however a great difference exists between his way of seeing and that of a certain number of scholars of antiquity who saw in each of the elements only one property, namely solidity, liquidity, gaseousness and was ethereal or imponderable , ie dryness , humidity , coldness and heat. One cannot overemphasize, in connection with the history of the human mind, the error of making an abstraction, a property a concrete being by taking the part for the whole; it is to arrive, in the natural sciences, at the result arrived at by those who, although considering an element as a concrete being, reason by attributing to it only a single property. In this respect the remark that the same effect can have two different opinions for cause is not superfluous in the history of science.

§ VII.

Of the alchemical opinion in which two orders of combinations are admitted in the metals.

The alchemists, starting with Geber, who lived from the 8th to the 9th century, distinguished the first, as I have just said, but without explaining it, the combination of the mixture. Geber called it mixtion, and he had a just idea of the influence of the nature of united bodies and of their proportion on the properties of mixtures. He also had great merit in distinguishing mixtures of two orders, such as immediate principles and elementary principles; but he had a false idea in claiming that the principles which are separated from the metals are three in number, sulfur, mercury, arsenic, and that each of these bodies contains the four elements. It should be added that Geber considered sulfur, mercury and arsenic, not as three chemical species, but as three genera each containing several species of sulphur, several species of mercury, several species of arsenic. What we praise in Geber is to have distinguished mixtures formed of immediate principles and elementary principles; he has, moreover, the undeniable merit of having described a fairly large number of chemical species by stating their properties as we do today.

I recall here, so as not to break the chronological order, that in the twelfth century Artephius considered the elements as each formed of four simple natures, heat, cold, humidity and dryness, a hypothesis, as I said, very favorable to the transmutation of matter 1.

In the 15th century, from 1406 to 1490, lived Count Bernard, known as Le Trévisan, author of several alchemical writings, the most remarkable of which, in my opinion, is the natural philosophy of metals. He admitted that the immediate principles of these bodies are mercury and sulphur, and that these contain the four elements.

But no alchemist has expressed himself in a manner so true and so profound as the Trevisan on the influence of form, or the influence of what may be called the different orders of combination and arrangement of the elements; for to confine oneself to saying, he writes, that bodies are formed of the four elements, is to advance that men, metals, herbs, plants, brute beasts, would be the same thing, a proposition which would be contrary to the principle that like begets like. Certainly there is a thought there on the living species much more exact than its variability admitted by Geber.

Contemporaries of Trevisan, two Dutch chemists, designated by the name of Isaac, admire three immediate principles of metals, like Geber, sulphur, mercury; but they substituted salt for his arsenic.

This substitution is easy to explain, if we are willing to reflect on the distinctions that had previously been made between the various properties of bodies, distinctions which, as I have said, had led to recognizing in the four elements the four states of aggregation of matter, solid, liquid, gas and ethereal or imponderable, or to reducing it to four properties, heat, cold, humidity and dryness.

The practice of so-called dry process chemical operations, where bodies are exposed to heat immediately, in other words, without the intermediary of a liquid, long preceded the practice of so-called wet process operations, because bodies react within a liquid. It is therefore not

surprising that, in this new period, observers have had more frequent opportunities of observing certain properties of bodies to which they had previously attached no importance. They were thus led to distinguish salt from other bodies. It was not an element, palatability, water solubility, and a weight and fixity average between that of earth and water.

After having spoken a great deal about alchemy in the *Journal des Savants*, but otherwise than it had been done before, new details would no doubt be superfluous, while general considerations summarizing a way of seeing which has obliged its author to long and tedious studies, will not be without interest.

Last thoughts on alchemy.

Let us now return to the origin of the transmutation of metals by taking advantage of the last studies I made of Artephius and Plato's *Timaeus*. Certainly I have never doubted that the cradle of alchemy is Egypt; I never misunderstood the disposition of the members of the school of Alexandria to seek the philosopher's stone and the universal panacea, from the moment when the means of acquiring both wealth and health attracted their attention: but probability only touched on certainty after the appreciation I made of the magnitude of the influence attributed by the Arab alchemist Artephius to the principle of similars, in bowing before the genius of Plato, and I must add after reading the translation of the *Timaeus* by M. Henri Martin and the notes with which the learned dean of the Faculty of Rennes has enriched his work. So I clearly understood that, if the Neoplatonists were not led to alchemy by their doctrine, from the moment they had the idea of it, it was for them a truth, so great is the intimacy between alchemy and this doctrine.

Recall how I said that Plato considered the elements a posteriori and a priori. Let us recall the passages translated by MH Martin and the notes which accompany them, and we will see that the transmutation of metals is a natural consequence of the transmutation of the elements into each other, admitted in principle by Plato, at least for fire, air and water.

Let us recall again the principle of similars, according to which Plato combats the union of opposites. So that, if he admits the possibility of it, it is on the condition of the intervention of a middle body participating in one and the other opposites.

Is there any stronger proof of the attention which the alchemists of the school of Alexandria must have paid to the ideas of Plato than the powerful influence attributed by an Arab alchemist of the twelfth century to the principle of similars? Indeed, chialor and coldness, two opposite or contrary natures, only unite through the intermediary of humidity, an opinion which, as I have observed; is indeed a question of principle, since it causes humidity to arise from the union of equal parts of heat and cold.

Artephius uses the same principle to explain the influence of the stars on terrestrial objects; according to him, a star of a given nature tends, by virtue of this same nature, to impress it, to communicate it to a terrestrial body which is in a favorable position to receive this influence.

Thus Artephius, admitting that lead comes from Saturn, tin from Jupiter, iron from Mars, gold from the Sun, quicksilver from Mercury, silver from the Moon and copper from Venus, recognized that a terrestrial object subjected to the influence of one of these stars, for example the Moon, tended to change into silver.

He went further still, when he admitted the possibility of bringing down the light, the spirit of a planet into an earthly being; for the man capable of accomplishing such an act had to prepare himself for it by putting himself as much as possible in harmony of resemblance with the star, and, on this subject, Artephius speaks of the nature, the color, the smell, the perfume, the flavor and the herbs of this celestial body.

But let no one lend me the thought of exaggerating my opinion by supposing that I extend it to all alchemists, for I shall be the first to cite Geber as a man who treats of transmutation from the theoretical point of view as well as from the practical point of view, as a chemist rather than an alchemist ; it is a justice that one cannot help rendering him.

Unquestionably, transmutation was simply and naturally derived from the ideas that one had of the transmutability of the elements, and the numerous quotations that I have made from alchemical texts, mainly from those dating from the sixteenth and seventeenth centuries, testify that, in the opinion of their authors, the object of the magister, of the practice of the great work, was to bring gold or silver to life, according to whether the adept wanted to convert a base metal into gold or silver, and that once the goal reached living gold or silver were endowed with the virtue of ferment, that is to say, with the faculty of converting quantities, if not indefinite , at least considerable , into their own matter.

Here, I believe, is a set of indisputable facts, coordinated in such a way as to bring conviction to all unprejudiced minds, of the origin of the ideas which presided over the founding of the alchemical hypothesis.

From the principle of similarities in aesthetics,
If the principle of similars has become inseparable from the alchemical doctrine, it has frequently been recognized as quite essential to aesthetics , as far as harmony is concerned.

The principle of similars, as Plato formulated it by claiming that the union of opposites is impossible, without the intermediary of a thing participating at the same time in the two extremes, is, as I have previously demonstrated, inexact; for, in an application that he makes of it, there is a question of principle 1 .

As for the sciences, three examples show their inaccuracy.

First, from the physical point of view, it is neutralization:

1° Of the two magnetic states;

2. Of the two electric states. Then, from a chemical point of view, it is neutralization:

3° Acidity and alkalinity.

To come to aesthetics, it is still all-powerful with many painters and people of the world: according to them, the harmonies that I have called analogs alone exist; it is therefore contrary to their opinion that I have admitted harmonies of contrasts, when I have sought to reduce the effects of color, in a precise language, to definite expressions, without concerning myself with pretended theories or rules which are current in the workshops of artists, and even in the language of salons and of more than one journal in possession of a reputation for good taste . I applied the experimental a posteriori method what I saw, but what I saw was not an accidental association, the bringing together of the colors proceeding from my will was an experiment made with premeditation, the result of which should lead to a considered judgment. It is by multiplying the experiments of this kind that I was able to make the work published, in 1839, under the title of the Law of the simultaneous contrast of colors , and to profess in Lyon, in 1842 and 1843, lessons on the theory of the optical effects of silk fabrics, lessons printed in 1846, at the expense of the Chamber of Commerce of this city. I will no doubt be asked how it is possible to bring in the experimental a posteriori method in the appreciation of the effect of colors, and the question will no doubt be dictated, without my saying, with the faith we have in the proverb, that neither tastes nor colors should be disputed. My answer is very simple.

Before the law of the simultaneous contrast of colors had been formulated, a certain number of facts which depend on it had been observed and described notably by the Earl of Rumford; but no one, I dare say, had had an exact idea of a general principle, unique in physiology and psychology: at the present time still, one publishes writings where one speaks of the book of the law of simultaneous contrast of colors without having read it, or, if it has been, one has not given it the attention necessary to know it . This parenthesis was perhaps necessary for people to appreciate what remains to be said.

The law of simultaneous contrast is based on the fact that a well-formed eye sees the juxtaposed colors as different as possible with regard to the height of their tones (value) and their respective specialties.

Thus, a juxtaposed light gray and dark gray appear, the first lighter and the second darker from the line of their juxtaposition.

As for the colors, they lose what they can have that is similar: thus green and violet have a common color, blue; by the juxtaposition, the two colors losing this blue, the green seems more yellow and the violet more red.

The law of simultaneous contrast of colors is therefore absolutely the inverse of Plato's principle of similars.

Such is the result of the experimental a posteriori method .Now all well-organized eyes have the feeling of the beauty of colors, and it is easy, by comparative experiment, to judge what given colors become by their juxtaposition, to know whether they embellish or detract from each other.

This is the work I have accomplished, and I can say that the results are positive and indisputable, since they ultimately mean that such juxtaposed colors become more beautiful or less beautiful. This, I repeat, is positive and indisputable. But, when it came to various assortments of colors, I said my taste without pretending to impose it on anyone.

How was I led to distinguish a kind of harmonies of analogs and a kind of harmonies of contrasts? It is again by experience, by seeing the combinations that one seeks in painting, in furniture, in clothing, in gardening, etc., it is by observing the pleasure that the eye has in seeing colors in seven different circumstances, that I have distinguished three harmonies of analogs and four harmonies of contrasts, without concerning myself with any principle, any rule, any law, any hypothesis to realize the fact. (Journal of Scientists, 1866, page 783.)

It is because I found myself in agreement with those who admire the harmony of red and green in the rose and its foliage, in the fruit of the cherry tree or dogwood on their leafy branches, the harmony of blue and orange (Newton cites the beautiful effect of the association of gold and indigo. , without hesitation, I qualified these assortments of harmonies of contrasts, for the reason that they present the association of mutually complementary colors, ie of those which are most different.

I have already had occasion to quote the strangest fact that I know of the exaggeration of the spirit of system. This is nothing less than a critique of the very essence of the law of simultaneous color contrast:

actually, it does not bear on facts which would be alleged as being contrary to it, but on the explanation of the beautiful effect of the association of the ruby and the topaz, which is attributed to the contrast, that is to say to a difference. Now, according to the critic, since harmony is born, can only be born of similarity, it is incorrect to say that the colors move away from each other in the association of these precious stones; red, taking violet complementary to yellow, and the latter, taking green complementary to red.

However, if we divide a circle into three sectors by three radii which we will designate by red, yellow and blue, by placing the ruby on the red and the topaz on the yellow, it is visible that the ruby moves away from the topaz by taking on violet, as the topaz moves away from the ruby by taking on green. In order for the ruby and the topaz to approach each other, the former would have to take yellow to the topaz and the topaz from the red to the ruby. Now the critic, accusing science explicitly in the name of practice, says: the colors come together, since both take du. blue! and we also know that a so-called simple color can only be shaded by another simple color, therefore red can only be shaded by taking blue or yellow, yellow by taking red or blue, and blue by taking yellow or red. Was I wrong to suggest that one had to have great faith in the a priori to make such an application of the principle of similars in the aesthetics of color vision!

We recognize without hesitation that more than one error reigns among artists, and, when we seek their origin, we find a certain number of them in Leonardo da Vinci's Treatise on Painting,

a remarkable work for the time when it was composed, but which, in its generality, includes proposals that time has not confirmed. It would be by seeking the origin of erroneous opinions that one could greatly improve the teaching of the fine arts, on the condition that the teacher would be obliged to demonstrate these errors and replace them with truths, demonstration possible today in many cases.

I will confine myself, as an example, to citing what can be done at present in the teaching of painting.

It is possible for the teacher to recognize if the eyes of each of his pupils are well shaped, or if they are affected by color blindness, a lack of organization which prevents certain colors from being seen.

It is possible for the teacher to teach pupils whose eyes are well adapted to see colors and to distinguish in a precise manner the three phenomena so remarkable of the simultaneous contrast of colours, of their successive contrast and of their mixed contrast.

It is possible, after these lessons, to teach them to compose their palette in accordance with the principle of mixing colors, the exact opposite principle of simultaneous contrast.

It has been almost forty years since one of the most illustrious artists of the Academy of Fine Arts, the late Huyot, showed me at his house some of the admirable drawings and tracings he himself had taken from the most famous monuments of Greece and Western Asia, where he had remained for ten years. He pointed out to me tracings of capitals, profiles of columns, friezes, etc., the actual shapes of which were very different from the aspect that the same parts presented in place in the view of the whole where they were. The difference of reality from appearance was not, he told me, the result of an accident, but rather a calculated effect of the genius of the artist.

There is therefore something analogous to what the colored model presents, which, in order to be reproduced faithfully as to the colors, must be painted otherwise than the eye sees these colors.

What consequence should be drawn from this state of affairs?

It is to seek the causes of what are called the errors of the senses; as for the eye, they concern colors and perspective.

All the phenomena of color vision, under ordinary circumstances when the eye is not fatigued by bright light or too prolonged attention, leave little to be desired when examined in accordance with the three contrasts and the principle of color mixture.

It is exactly the same with a fairly considerable number of phenomena of perspective; but, to fully understand the reason, we must consider that we learned to see from our earliest

childhood, and that the memory, I do not say of studies, but of constantly renewed attempts to achieve it, has been erased from our memory, so that in adulthood, by reflecting on this past, it is impossible for us to find the slightest trace of it.

If we want to get a satisfactory account of what the question of so-called errors of perspective is today, we must distinguish two very different cases:

1st case.

That where everyday experience allows us to recognize the truth, of an appearance differing from reality, so that in this case the word error is only justified by the ignorance where one would be of the cause of the effect.

I cite two examples:

1. The perspective of an avenue of trees bordered by two parallel rows.

Everyday practice actually shows us the parallelism. And the geometrical perspective shows that it cannot be otherwise according to the size of the visible angles: 1° of the two shafts of the end where one is; 2° of the two shafts at the opposite end.

2. A stick dipped obliquely at one end in the water ceases to appear straight.

Experience shows us that it does not cease to be so in the water. And the knowledge of refraction explains to us that it cannot seem straight as soon as one end dips obliquely into a denser medium than looks.

2nd box .

There are so-called errors of perspective very different from those of which I have just spoken because of the impossibility in which we find ourselves to recognize the truth by practice. Such is the apparent magnitude of the sun and moon seen on the horizon relative to what they appear when overhead.

Euler, in his letters to a German princess, gave a reason for this which seems to me correct, by saying that the celestial vault appearing to us lowered, it follows that the same object seen at the horizon must appear larger to us than if we see it at the zenith, since we judge it further from us, and he also says that the less bright light on the horizon adds to the illusion. But I do not doubt the influence of another cause, of which I spoke a long time ago. When we look at objects included in an extended horizon, we only see distinctly those which occupy a rather narrow space, which I call central. The objects that I call lateral to the left and right of this space are seen indistinctly. Well, they change the view we have of central objects by making them bigger and closer. The proof is that, if we looked at the central objects with a tube of 0.015 to 0.005 m. in diameter, we see them smaller and more distinct; as for the moon, it looks pretty much what it is above the horizon. But, to appreciate exactly the effect of the tube, it should not be compared with the ordinary vision of the two eyes, because the difference would be exaggerated by the reason that the vision of only one eye differs sensibly from the vision with

the two eyes; therefore the effect of the tube must be compared with the vision of a single eye. By repeating my experiments, by my tubes, one will be convinced that Euler was wrong to say that the moon on the horizon, seen through a hole, appears what it is to free vision. Ultimately, the vision of a single eye is significantly different from the vision of both eyes, and approaches what it is with a tube.

I have every reason to think that these observations adequately explain the size of the moon and the sun on the horizon.

It is necessary to erase from the books of science the expression of errors of the senses, and to say that those of which today we are not aware are problems to be solved; that there can be no more errors of the senses when the mind has treated these questions scientifically, because then it has recognized their real causes. Ultimately, what we call errors of the senses is the consequence of the ignorance of our understanding.

The research that I call on the study of the senses and particularly on that which concerns the practice of the fine arts will put an end, I hope, to a state of things quite contrary to progress. Indeed, when so many mouths pronounce this word, and so many newspapers, by proclaiming it, claim to condemn error and combat prejudice, how does it happen that among them there is not a protest against so many people who, professing what they do not know, propagate erroneous opinions, whether they derive them from their own background, or have accepted them without examination from elsewhere?

E. CHEVREUL

QUOTE OF THE DAY

“it is always the safest way to learn from others misfortunes.”

Bernard Trevisan

Quest for the Stone

1,085

Alchemical Books

150

Audio Books

419,512

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